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POWER AND GAS

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UNIVERSITY OF CALIFORNIA 5 PERIODICAL DIVISION

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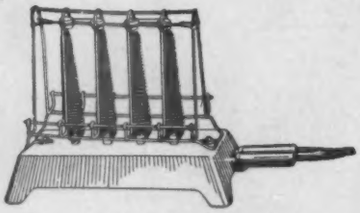
CHRISTMAS—this year

it's to be more of an electrical season than ever before



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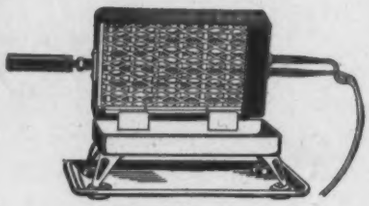

Electric Grill

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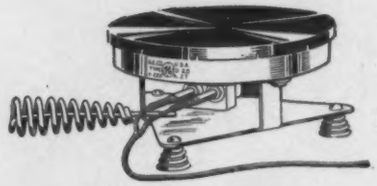
Display and demonstrate to them the advantages of making useful gifts and of having in the home



Electric Disc Stove

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Heating Appliances

Favor on the part of the housewife—real unshakable favor—because they meet the practical demands of the home, the hard knocks and wear and tear of every-day use.

It is their absolute dependability—stability—the high quality of material—fine workmanship and careful construction that have won for G-E heating appliances permanent favor.

Those pictured here are only a few suggestions from the line. We will be pleased to mail you a catalogue or send our representative to talk with you.

Show how added attractiveness can be given Christmas trees by lighting with ELECTRIC CHRISTMAS TREE OUTFITS

Series Lighting Outfits—100-130 volts in 8, 16, 24 and 32-light capacities
Multiple Lighting Outfits—100-130 volts in 7, 14, 21 and 28-light capacities
all connected ready for plugging into outlet. Lamps in many shapes and varieties including animals, fruits, flowers, plain or beautifully colored.

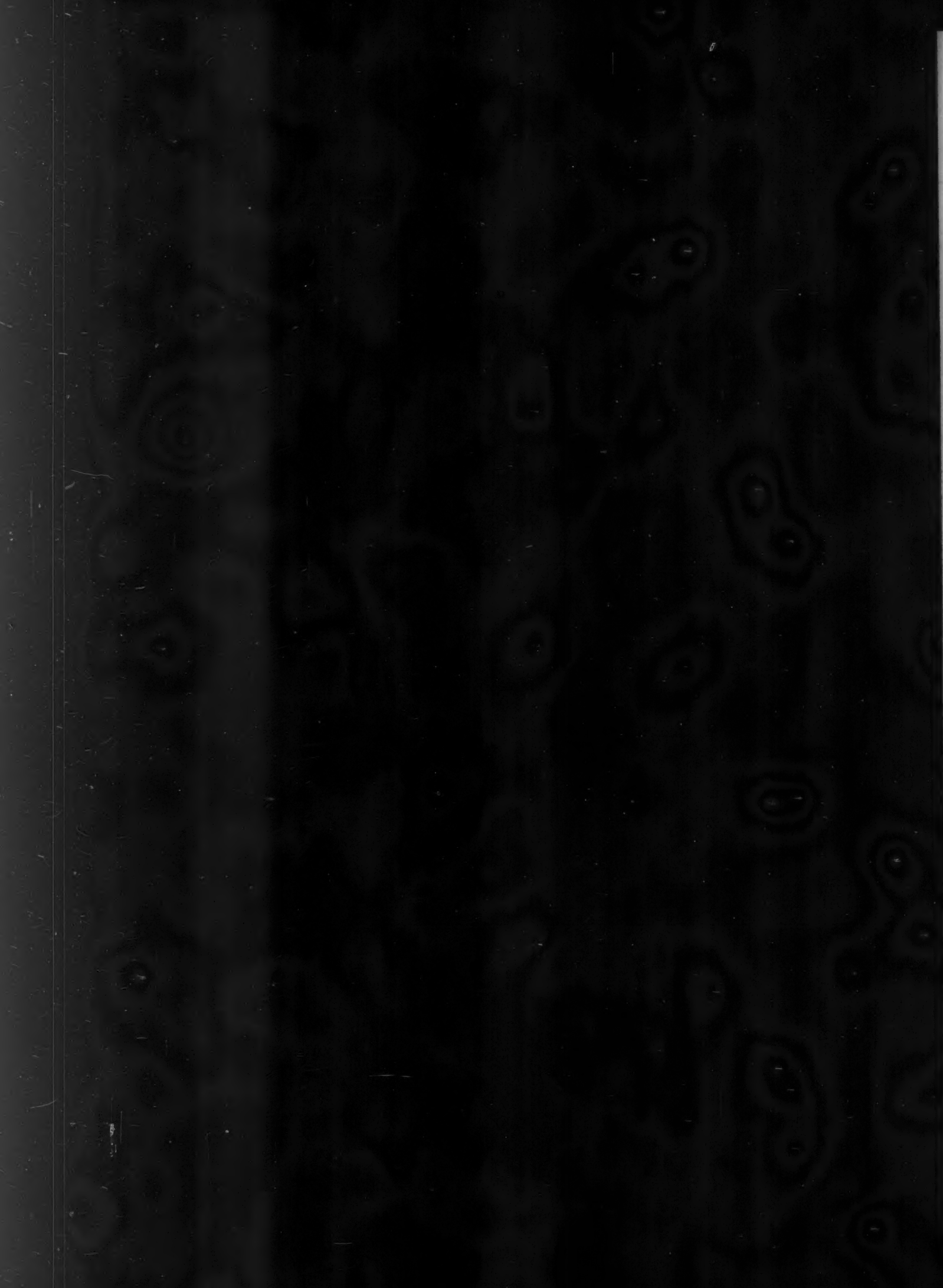
PACIFIC STATES ELECTRIC CO.

The Modern Electrical Supply House

Distributors for the Pacific Coast

LOS ANGELES OAKLAND PORTLAND SAN FRANCISCO SEATTLE

Member Society for Electrical Development—"DO IT ELECTRICALLY"



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VOLUME XXXIII SAN FRANCISCO, NOVEMBER 28, 1914 NUMBER 22

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P.P.I.E. GAS EXHIBIT

One of the most important steps ever taken in the gas industry is the decision of the American Gas Institute to endorse a collective gas exhibit at the Panama-Pacific International Exposition. Through the well-directed efforts of E. C. Jones, newly-elected president of the Institute and chief gas engineer for the Pacific Gas & Electric Company, arrangements have been completed for the reservation of 10,000 sq. ft. in the northwestern portion of the great Palace of Manufacturers and plans are now well advanced for a most comprehensive exhibit.

Engineers of London will be represented and papers have been promised from foreign countries throughout the world. A conservative estimate places the probable attendance as at least one thousand.

Nearly one-fourth of the possible exhibitors in this section promised to make a showing before any systematic effort had been made to secure them, and from present indications the space will be heavily oversubscribed.

Designs are now being made for a beautiful pavilion as a housing for the collective exhibits, with every

Palace of Manufactures, P. P. I. E.

This is the first time that a collective exhibit of gas appliances has ever been planned for an international exposition. Heretofore exhibits have been scattered over a wide area and the magnitude of the gas industry has not been evident. The exhibit will be of peculiar value in connection with the International Gas Congress which will be assembled at San Francisco during the week of September 27, 1915. The various gas associations throughout the United States have nearly 8000 members. The Institution of Gas

opportunity to display the application of gas for lighting and heating. Sixty exhibit spaces have been arranged and an active campaign has been started by John B. Redd of San Francisco, who will supervise the local work. His efforts will be ably seconded by a committee appointed by John A. Britton, consisting of Frank A. Cressy Jr. of Modesto. chairman; F. A. Leach, C. B. Babcock, R. S. Thompson, D. E. Keppelman, F. C. Millard, Paul Hough, H. P. Pitts, H. R. Basford, R. S. Pederson and E. C. Jones.

THE USE OF MOVING PICTURES FOR ENGINEERING PURPOSES.

BY E. N. PERCY.

In taking up this subject, engineering is referred to in the broadest sense of the word, meaning the commercial engineer as he exists today in the fields of civil, mechanical, electrical, sanitary and other departments. The purely technical engineer is becoming less known, and engineering work becomes more and more a problem of meeting commercial requirements and selling goods. Our industries are now managed by engineers and the policies are shaped to suit engineering ideas. The sales departments are in charge of engineers, and the goods are sold along engineering lines. They are also purchased by engineers to comply with specifications drawn by other engineers. Engineers as a class find themselves confronted with the problems of design, manufacture, distribution, sales and maintenance. In these fields the cinematograph can be very useful, as has been already proven. Its uses are naturally divided into two classes. First, purely scientific. Second, advertising.

As ordinarily exhibited for the benefit of audiences, cinematograph pictures are shown at the rate of sixteen per second, each sixteen pictures occupying one foot of film. The principles of the moving picture are so well known that they need not be explained in this article. For scientific purposes cinematography is governed by two considerations. First, the speed at which the picture is taken; second, the magnification at which it is taken. For scientific purposes these speeds vary from 30,000 exposures per second to as little as one exposure per hour, or even one exposure per day. The extremely high speeds are used for photographing bullets in their flight, the bursting of soap bubbles, the action of explosives, the action of jets of water, and other high speed phenomena. The low speeds are used to illustrate the construction of large buildings, the growth of a flower, the development of an animal, or changes in structural materials. All of these pictures are then reduced to normal speed for projection.

The magnification ranges from that used by the highest power ultra-microscope to the opposite extreme, presenting on a small screen the map of an entire country, or views taken from an aeroplane, or telescopic views of the heavens. Both the speed and the magnification are differentials dependent upon each other, as well as upon the subject under consideration.

With such possibilities, it is easy to conceive that the cinematograph can be useful to the engineering industry as a whole. Many high speed processes, such as the flow of steam, air and gases, combustion and explosions, automobile engines, the action of governors, the synchronism of generators, the flow of water in turbine wheels and water wheels, the action of woodworking machinery, the action of machine tools, etc., may be photographed at high speed, and reduced to a speed in which the action may be studied with the utmost accuracy. For instance, a rifle bullet, or an exploding shell has been shown on the screen no faster than the crawl of a fly. The slow speeds are adaptable to structural work of any kind, the fatigue of metals, the testing of various materials extending over a period of days, etc. Use has already been made of this system to record motions made by workmen, with a view to improving them in accordance with the new studies in efficiency.

The magnification may be made use of by sanitary engineers to record the development of bacteria over a period of time, the condition of water, etc. It may be made use of by municipal engineers to record the condition of a street over a period of weeks, not only in its entirety, but detail specimens of the materials used, the value of the cinematograph in these various works being that it illustrates the microscopic examination in its entirety.

Up to the present time the great weakness of microscopic examination has been that any given plate shows only a fraction of the examination as pursued by the inspector. The possibilities of microscopic examination are endless in their application and examination of materials, manufactured products, chemicals, minerals, etc. Agriculture is now approaching engineering so closely that mention may be made of the use of the cinematograph for studying insects, and the development of fruit, together with the development of pests, in conjunction with the microscope. Without doubt, great strides could be made in this field. The Marey Institute in Paris, incorporated by Dr. Marey, now deceased, under the guidance of Pathe Freres, is one of the very few institutes of this kind now in existence, another one in Belgium having been destroyed by the war. An institution of this kind is now being developed on the Pacific Coast, and no doubt excellent work will be done.

The cinematograph opens up an entirely new means of advertising. Advertising naturally divides itself into two great classes—general and specific. General advertising must make use of general mediums, such as will make a general appeal for goods offered to the household, or personal things, or things for the office, or the auto, grocers, jewelers, etc. Examples of things requiring specific advertising, appealing through specific mediums, to a specific class, are things mechanical, electrical, scientific, sanitary, structural, medical, surgical, agricultural or musical. Films for advertising purposes, like any other form of advertising, must, in each instance, be composed to suit the mind, and the state of mind of the specific class to which it is addressed. This is governed to some extent by the places at which it is possible to exhibit these films.

These may be divided into three classes, viz: private, expositions or fairs, and public theaters. These three divisions of exhibits cause the film composition to be divided into three classes, as follows: First, for private exhibition and study, the films should be highly technical, as they are intended simply for the study of the firm, its interested representatives, and its most important customers, or their engineers.

The second class of film, intended for expositions and fairs, is addressed to a serious-minded people, who as a rule, are seeking points of interest and information, yet would have no patience with highly technical subjects. In other words, this second class of film must be industrially interesting. It may show the in-

teresting points of an industry, its magnitude, its great stocks of merchandise, the various processes in the factory, and most important of all, correct methods of using the products. Such films must be full of action where possible, and no one view or scene should be shown for more than fifteen or twenty seconds without a change. No processes should be shown more than once, and tediousness of any kind cannot be tolerated. The hardest thing for a manufacturer to remember is that his business is not as interesting for the world as it is to himself, unless he makes it so.

The third class of film, intended for public theaters, "movies," &c., must be popularly interesting, and this feature must predominate absolutely at the expense of any industrial consideration. Otherwise, the circuits will not accept the film. For instance, one of the best films prepared by a well known shoe company, for advertising purposes, showed a moving picture, most fortunately obtained when its factory burned up, followed by a slow picture taken during the erection of its new factory. This followed in turn by a trick film, showing its various models of shoes with dancers, clowns, &c., apparently of miniature size, climbing out of them. These were followed by other equally spectacular scenes, all of which blended into a good advertising film, acceptable to popular theaters. On the other hand, to illustrate the use of the cinematograph for scientific purposes, an automatic pistol manufacturer had a high speed film taken of the mechanism of his make of revolver when in action. When the pictures were developed and slowed down for projection, fine grains of powder were seen slowly leaving the mechanism, as it worked slowly on the screen, showing that the cartridges were overloaded. This defect was remedied by the manufacturer.

Many of these scientific films can be used for exhibitions, and even for theater work, provided they have proper titles and explanations to make them interesting. Well known trademarks can be used, provided they are followed by an illustrated use of the product, and this may be followed by an illustration of possible harm resulting from not using it. All of these points, of course, require experts in order to be properly worked up.

To get such films before the public it is necessary to approach some of the large exchanges at headquarters. As a rule, they will not pay anything for an industrial film unless of extraordinary popular interest, but they in turn do receive something for the film from the theater. They object, as a rule, to advertising head-lines or titles or any mention of the firm name in the explanatory titles, but on the other hand, it is possible to introduce the firm name into the pictures on wagons, store fronts, packages, etc.

These pictures, like any other form of advertising, may be in accordance with a general policy of publicity, or with a specific policy to keep some name before the public, or a specific policy to explain a certain product, or certain virtues of a product, but in any case, must have a definite object according with a definite policy of advertising, the same as in any other form of advertising.

It is well known that much money is lost in advertising, and can be lost in the same way by the use of moving pictures not in accord with some definite object of advertising policy. The cost of getting up a film of this character varies from $1.00 to $5.00 a foot, including traveling expenses, film and incidentals. An industrial film for private purposes may be of any length, a thousand feet taking from twenty minutes to half an hour for inspection. One or two thousand feet is usually as much as can be used at exhibitions and fairs, and is usually accompanied by a lecturer. Five hundred to one thousand feet is as much as the average theater will pay for unless of the most extraordinary interest. The exchange will usually request from half a dozen to a dozen prints of a good film. These prints will cost in the neighborhood of ten cents a foot each. In case a manufacturer is fortunate enough to have his material accepted by one of the large exchanges, they may require as many as one hundred prints, but in this case some arrangement would be made, as such exchanges do not accept films unless there is a good prospect of remuneration. Money in a general way, is no object to the theater man unless it comes from the audience, because it would be folly for him to screen anything not of absorbing interest to his clientele, regardless of inducements which might be offered him.

There are many free-lance camera men now available for all kinds of work, but for reliable production it is wiser for intending exhibitors to patronize reliable firms, who are in a position to guarantee results. The country at this time, and for the last few years, has been covered with moving picture producers who start into the business with insufficient capital, connections and skill, and the majority of them are failing, several having failed in San Francisco within the last few months. However, an industry of this kind is bound to have some setbacks, and the period is now at hand when scientific and industrial possibilities will be enlarged upon, particularly as the public is somewhat tired of drama, adventure and sensationalism, in substantiation of which we note the increasing popularity of the news weeklies and scientific films.

CANAL TRANSPORTATION TELEPHONE SYSTEM.

In order to facilitate the despatch of vessels through the Panama Canal, by insuring prompt and certain communication between the various points of operating control, a special telephone system has been installed, connecting on one line, in series, the offices of the port captains, the control houses at the locks, the Gamboa signal station, the Dredging Division, and the office of the Superintendent of Canal Transportation. Each station has its call signal, in combination of long and short rings, and there is a general signal for the attention of all. Thus, at one speaking, any of the operating stations can communicate information to all the others. For instance, when a vessel clears from a terminal harbor to make the transit of the canal, say from Cristobal, the office of the port captain at Cristobal will sound a general call; all the other offices will "Listen in" and the message will be delivered.

INDUSTRIAL USES OF FUEL OIL.

BY F. B. DUNN.

(Continued.)

Boiler Furnace Arrangement.

The construction of the furnace for oil varies with the type of boiler and the class of burner used. It is the most important part of the installation, but until recently has received the least attention by the engineers. It is in the furnace that the proper combustion of the oil must take place. A slight difference in the amount of air admitted may mean a great loss of heat units. It is an easy matter to secure a smokeless fire, but efficiency can only be obtained by having a carefully designed furnace.

Fig. 12 shows the method of applying oil to a return tubular boiler employed by many engineers. It will be noticed that the air is supplied from the rear end of the boiler, and is compelled to travel the entire length of the furnace, under the grate, before entering the combustion chamber. Thus the air is preheated before entering the fire box. Fig. 13 shows a patent furnace arrangement, with the burner placed at the back end of the furnace. This type of furnace has been successfully applied to water tube boilers of various designs. Fig. 14 illustrates the burner and furnace arrangements for the Coen system as applied to B. & W. marine boilers. It will be noticed that the regular coal firing doors have been moved from the furnace front, and special air regulating fronts substituted. The burners are located as shown, one in each doorway, and the main flow of air for combustion is regulated by a sliding plate surrounding the burner. Auxiliary air is admitted through the ash pit doors.

An important feature of the interior furnace arrangement is the provision for a current of insulating air to circulate from the back to the front end of the furnace, between the ash pan and the furnace deck. This is accomplished by cutting two air openings of sufficient area in the back of the furnace and constructing an air duct 2½ in. in height, running from front to back the full width of the furnace. When these rear doors are open, which is the case only when the fires are in operation, a current of air is admitted which travels rapidly forward through the ducts, entering the combustion chamber through the firing arches in front of the burners. This circulating air serves a double purpose; it affords perfect insulation between the ash pan and the furnace, and provides the furnace with preheated air, which is an important aid to rapid combustion.

Fig. 15 shows the furnace arrangement under the Parker boiler. The former grate bar level has not been changed; a layer of fire brick properly spaced over the grate bars was all that was necessary to change to oil fuel.

Fig. 16 illustrates another furnace arrangement for a B. & W. boiler. The grate bars are lowered a few inches and then covered with a layer of fire brick. In spacing the fire brick, it is common practice to leave out one whole brick about five inches in front of the burner. The other bricks, for a distance of three feet from the front, are left about one inch apart, allowing the air for combustion to pass up and through the flame. The air is thus heated by coming into contact with the hot bricks. The spread and length of the flame can be regulated by the spacing of the fire bricks.

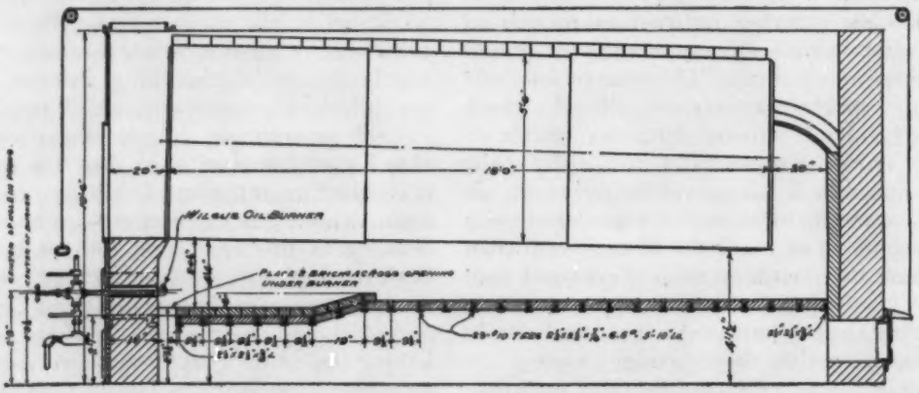


Fig. 12. Setting for Wilgus Burner Under Return Tubular Boiler.

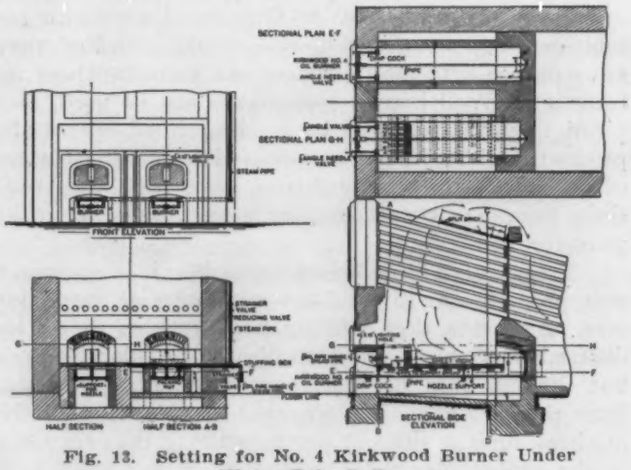


Fig. 13. Setting for No. 4 Kirkwood Burner Under Water Tube Boilers.

Fig. 17, 18 and 19 show the general arrangement of the S. & P. burner as applied to the Scotch marine boiler. The grate bars are entirely removed, as are the bridge wall and front dead plate. A ring of fire brick is fitted in the throat of the furnace and a number of old grate bars are placed on an incline. On account of the round shape of the furnace they are cut off as shown in Fig. 18. A single layer of fire brick is placed over these bars and spaced as shown in Fig. 19. When forced draft is used the openings 1 and 2 are closed. The necessary air is regulated by the damper

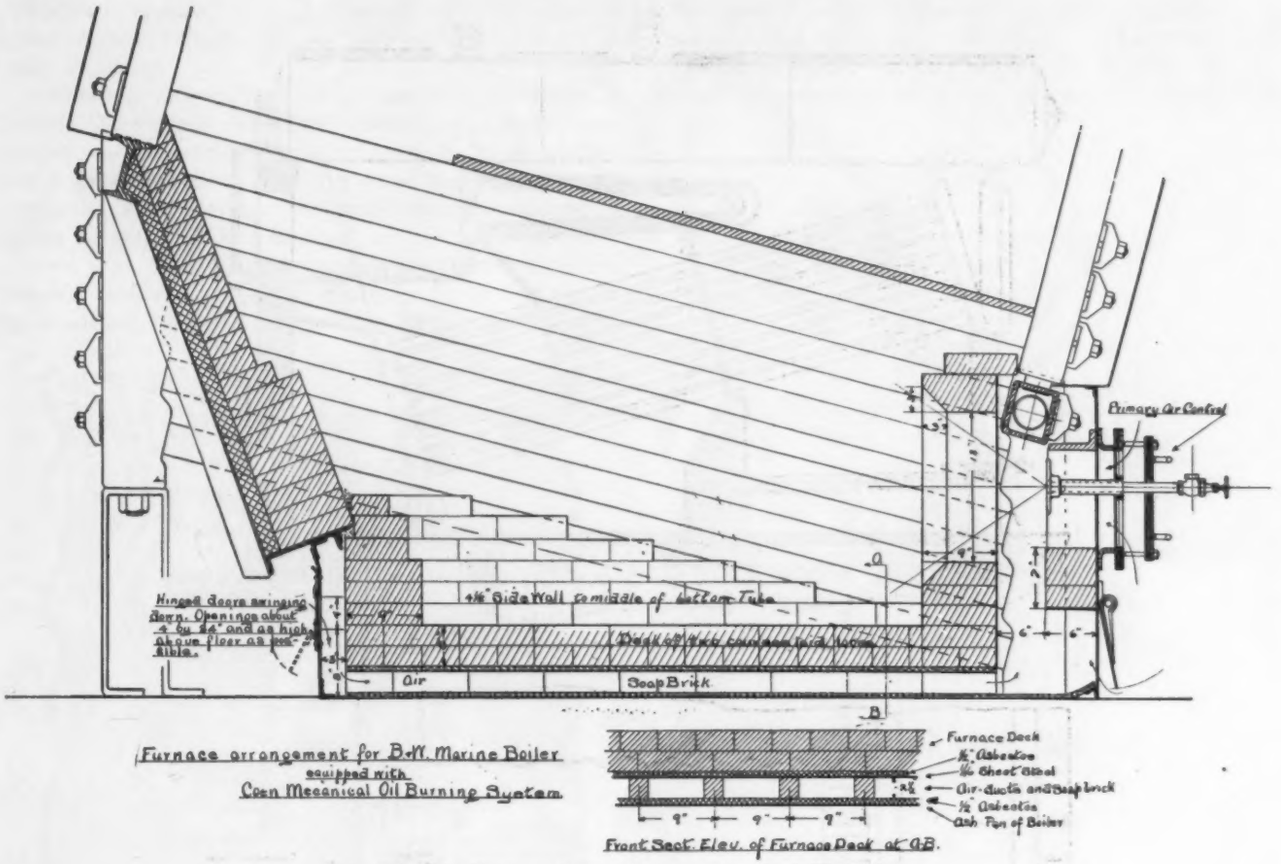

Primary Air Control
Hinged doors swinging down. Openings about 4" by 8" and as high above floor as possible.
4½" Side Wall to middle of bottom Tube
Air
Soap Brick
Furnace arrangement for B&W Marine Boiler equipped with Coen Mechanical Oil Burning System.
Furnace Deck
½" Asbestos
No. Sheet Steel
Air-ducts and Soap brick
½ Asbestos
Ash Pan of Boiler
Front Sect. Elev. of Furnace Deck at A-B.

Fig. 14. Furnace Arrangement Under B. & W. Boiler.

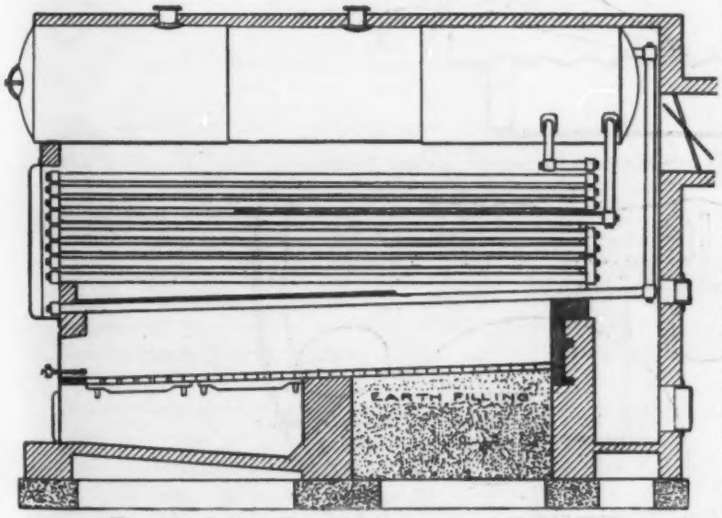


Fig. 15. S. & P. Furnace Arrangement Under Parker Boiler.

C. The burner is placed as shown, generally five inches above the fire brick. This type of furnace arrangement has been used with great success by many of the large steamship companies operating on the Pacific Coast.

Fig. 20 shows the application of a Wilgus oil burner to an upright boiler. A 3 in. tube is expanded through the water leg of the boiler, in which the burner is placed. A ring of fire brick about 14 in. in height is placed around the sides of the furnace; fire brick are also placed about 1 in. apart on top of the grate bars. By this arrangement the boiler can readily be used for wood or other fuel, by simply removing the burner. Many plants burning oil use this type of boiler for getting up steam required for pumping systems and burners operating the main boilers, after having been closed down on Sundays or holidays.

Much better furnace efficiency can be secured by having an oil burning expert inspect the furnaces when a change to oil fuel is contemplated. Such an expert will design a furnace front without expensive grate bars, bearing bars, or other fittings that a salesman might be anxious to install, and at the same time provide a furnace from which the highest efficiency may be secured. The vital importance of correct design and construction of furnaces will be further emphasized in a chapter on combustion.

The required height of chimney for fuel-oil plants is much less than is ordinarily supposed when the boilers are operating at or below their rated capacity, and considerably greater than is usually supposed when there are heavy over-loads. As pointed out by Mr. C. R. Weymouth, of San Francisco, Cal., in a paper read before the American Society of Mechanical Engineers, a chimney of undue height will take an excessive quantity of air for combustion and permit an excessive load on the boilers, both resulting in a large waste of fuel. When the chimney height is limited to that necessary for economical air supply at the desired boiler load, it will be impossible for the most careless fireman to cause serious waste of fuel, either by supplying excessive air, or seriously overloading the boilers. The chimney may thus become

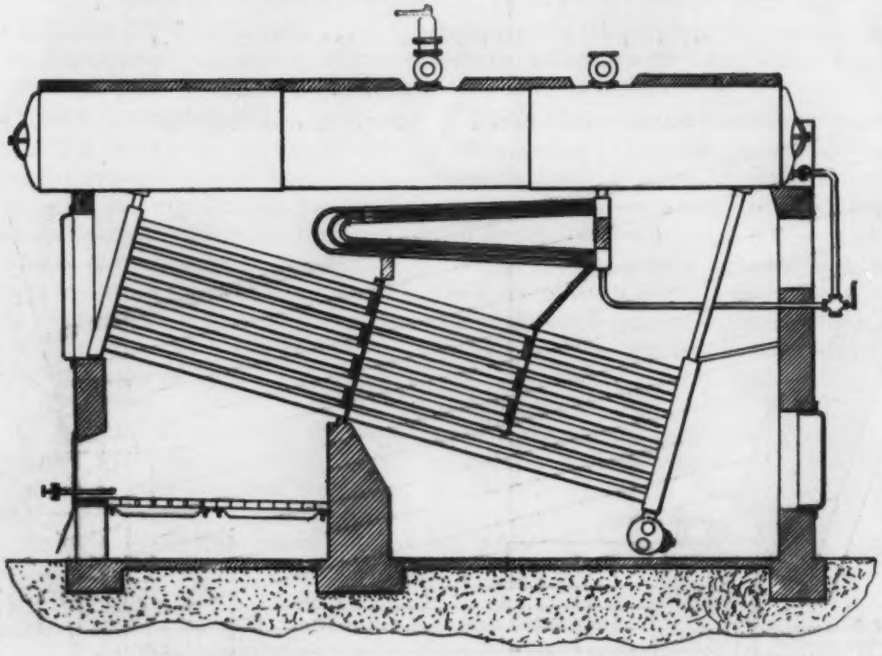


Fig. 16. S. & P. Furnace Arrangement Under B. & W. Boiler.

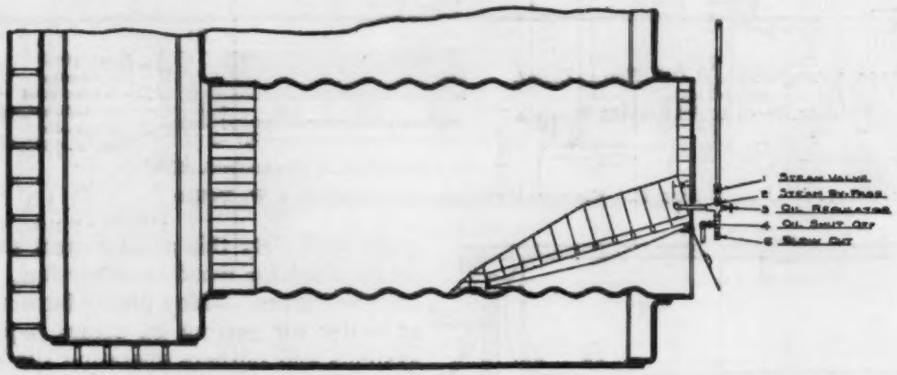


Fig. 17. Longitudinal View of Burner Arrangement for Scotch Marine Boiler.

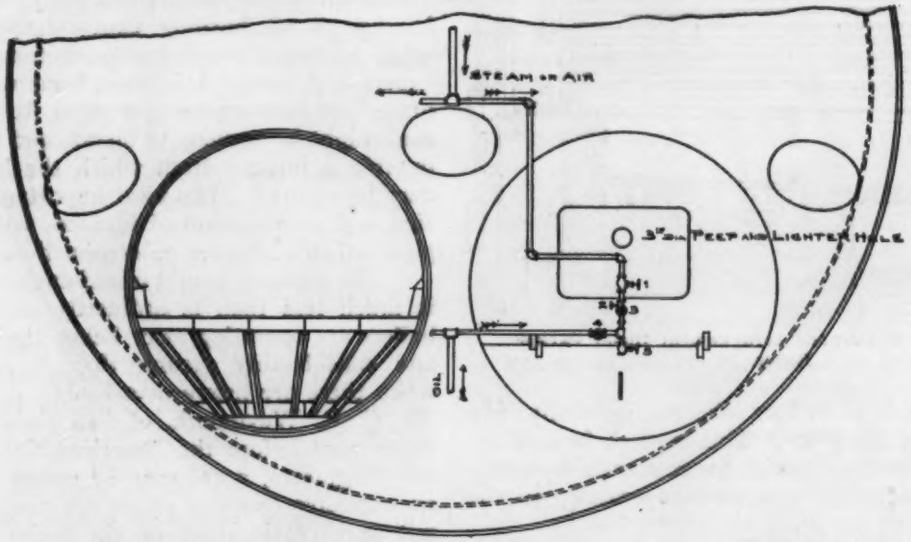


Fig. 18. Cross Section of Burner Arrangement for Scotch Marine Boiler.

an important and inexpensive means of regulating boiler-plants, and an automatic safeguard against careless firing. Such service is, of course, most successfully secured only in plants operating at uniform load.

The San Francisco earthquake of April 18, 1906, considerably reduced the height of most masonry chimneys, and resulted in an extensive collection of chimney data. Many of the results obtained apparently were contradictory. Certain chimneys, reduced to a height of 30 ft., gave the usual boiler capacity;

and others, reduced only to a height of 75 ft., showed under certain conditions of service a decrease in boiler capacity.

Altitude has an important bearing on chimney design. The error commonly made in the determination of stack capacities at high altitudes is to assume that a given grade of fuel at a fixed boiler rating will require at high altitude the same draft, measured in inches of water at the damper, as at sea level. It is evident that to develop a given boiler horsepower requires a constant weight of chimney gases and air for combustion. As the altitude is increased, the density of the air is increased, and, correspondingly, its velocity through the furnace, the bed of coal, or the fire brick checkerwork. The boiler passes must therefore, be greater at high altitude than at sea level. The mean velocity for a given boiler horsepower and constant weight of gases will be inversely proportional to the barometric pressure. And the velocity head, measured in column of external air, will be inversely proportional to the square of the barometric pressure.

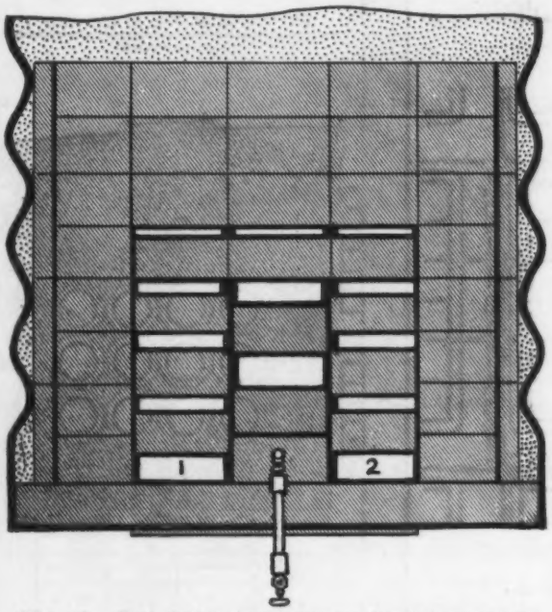


Fig. 19. Fire Brick Arrangement for Oil Burning for Scotch Marine Boiler.

For chimneys built at high altitude it is necessary to increase not only the height, but also the diameter. The increase in height causes an added frictional resistance within the chimney; this frictional loss must be compensated by a suitable increase in the diameter, and when so compensated it is evident that the chimney height must be increased at a ratio inversely proportional to the square of the normal barometric pressure.

Based on 150 per cent as the ratio of actual boiler h.p. to rated boiler h.p. and assuming sea level atmospheric pressure and 80 degrees F., the author presented the accompanying table of approximate maximum capacities measured in actual boiler h.p. These data apply to steel chimneys with short flues, the chimneys being centrally located over stationary B. & W. boilers. Other conditions are: Draft in inches at boiler outlet, chimney side of damper, 0.30; corresponding excess air through boiler, per cent, less than 50; assumed excess air supply for determining boiler efficiency, chimney diameter and draft resistance of chimney and breeching, per cent, 50; assumed temperature of gases leaving boiler, 525 degrees F.; assumed temperature of gases entering chimney, 500 degrees F.; assumed boiler efficiency, working not test conditions, 73 per cent; assumed pounds of chimney gases per actual boiler h.p., 54.6:

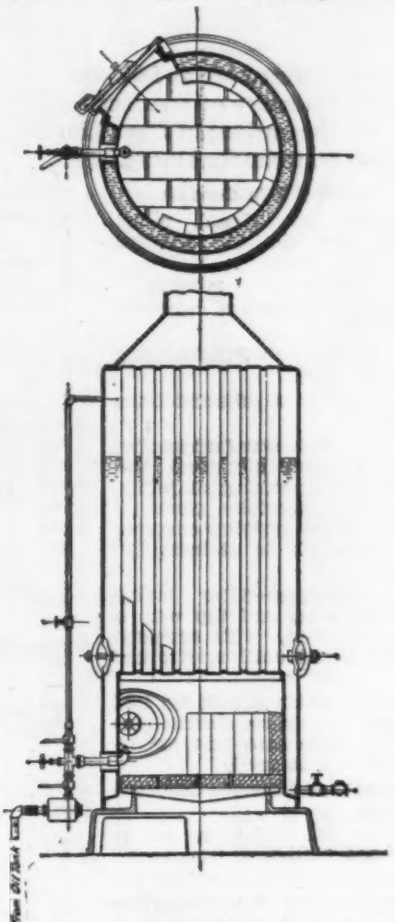


Fig. 20. Wilgus Burner Arrangement for Upright Boiler.

Table of Approximate Maximum Capacities (Actual Boiler h.p.) for Oil-Burning Chimneys (Boilers 150 Per Cent Rating)

Diameter, in.	Area, Sq. ft.	Height in Feet Above Boiler-Room Floor line. 80	90	100	110	120	130	140	150
18	1.77	63	75	84	91	96	101	104	108
21	2.41	90	108	121	131	139	146	151	156
24	3.14	123	148	166	180	191	201	208	215
27	3.98	161	195	219	238	253	265	276	285
30	4.91	206	249	280	304	324	340	354	366
33	5.94	256	310	349	381	405	426	444	459
36	7.07	312	379	427	466	497	523	545	564
39	8.30	376	455	514	561	599	631	657	681
42	9.62	448	539	609	665	711	749	782	810
45	11.05	518	630	713	779	834	879	918	952
48	12.57	599	729	287	904	967	1,020	1,070	1,110
54	15.90	779	951	1,080	1,180	1,270	1,340	1,400	1,460
60	19.64	985	1,200	1,370	1,500	1,610	1,710	1,790	1,860
66	23.76	1,220	1,490	1,700	1,860	2,000	2,120	2,220	2,310
72	28.27	1,470	1,810	2,060	2,260	2,430	2,580	2,710	2,820
78	33.18	1,750	2,150	2,460	2,710	2,910	3,090	3,250	3,380
84	38.49	2,060	2,530	2,900	3,190	3,440	3,650	3.840	4,000
90	44.18	2,390	2,950	3,370	3,720	4,010	4,260	4,480	4,670
96	50.27	2,750	3,390	3,880	4,290	4,630	4,920	5,180	5,400
102	56.75	3,140	3,870	4,440	4,900	5,290	5,630	5,930	6,190
108	63.62	3,550	4,380	5,020	5,550	6,000	6,390	6,730	7,030
114	70.88	3,990	4,920	5,650	6,250	6,760	7,200	7,590	7,930
120	78.54	4,440	5,490	6,310	6,990	7,560	8,060	8,490	8,890
126	86.59	4,930	6,100	7,020	7,770	8,410	8,970	9,460	9,900
132	95.03	5,450	6,740	7,760	8,600	9,310	9,930	10,500	11,000
138	103.90	5,990	7,420	8,530	9,460	10,300	10,900	11,600	12,000
144	113.10	6,550	8,120	9,350	10,400	11,200	12,000	12,700	13,300
156	132.70	7,760	9,630	11,100	12,300	13,400	14,300	15,100	15,800
168	153.90	9,060	11,300	13,000	14,400	15,700	16,800	17,700	18,600
180	176.70	10,500	13,000	15,100	16,700	18,200	19,900	20,600	21,600

(To be continued.)

ELECTRIC DISTRIBUTION

STANDARDS IN SAN DIEGO.

Section J—Underground Construction Details.

BY L. M. KLAUBER.

[Concluded.]

The items covered are as follows:

J 10. Summary of Specifications.
J 20. Dimensions of Duct Lines.
J 30. Material for Duct Lines.

J 10. Summary of Specifications. Only a few points are here briefly covered; they are designed more to be of assistance in service work than in the more important main lines.

J 10.1. Vitrified Tile Conduit.

Tile—Vitrified salt glazed, round bore, single duct tile, 18" lengths, butt joints, 3½" bore.

Concrete—One-three-five mixture.

Mortar—One part Portland cement—2/3 sand.

Concrete Bed—3" thick, extending 3" beyond the duct.

Joints—All joints in adjacent lines to be broken.

Laying Duct—Use a standard wooden mandrel to preserve alignment and keep mortar from entering at joints. All joints to be carefully plastered with mortar before applying concrete envelope. Mortar to be at least ¼" thick.

Concrete Envelope—After laying duct, surround sides and top with a 3" concrete envelope. This envelope must not be placed until mortar has set.

Obstructions—Ducts should be laid in a straight line unless obstructions intervene, in which case long sweeping curves should be used.

Traps, Pockets and Reverse Curves—Not permitted.

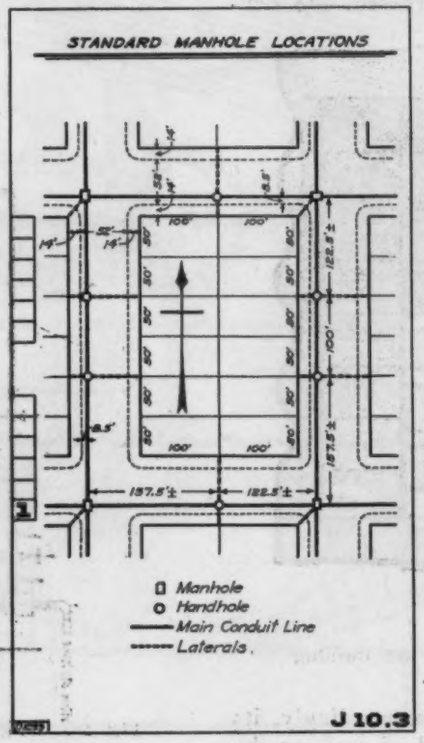
Depth—Top of conduit to be at least 18" below bottom of pavement.

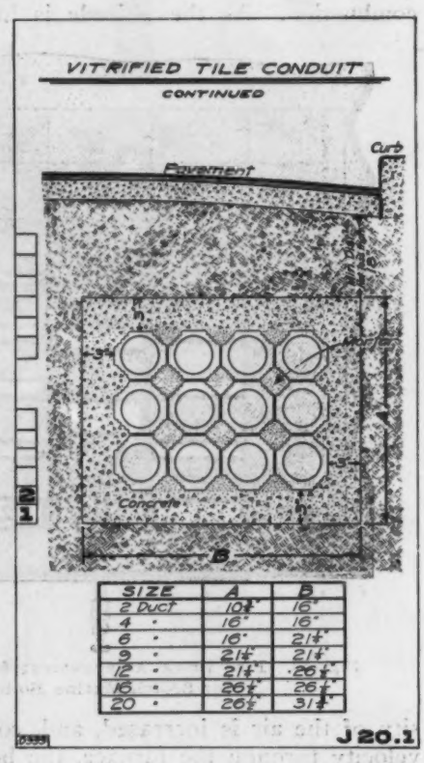
Grade—Shall be at least 6" per 100 feet. 1 foot per 100 feet where possible. Grade toward manholes in a straight line; if this is not possible on account of obstructions, arch or crown the line to grade toward both manholes. Grade all services toward manholes.

Plugs—Plug all ducts with wooden plugs when work is suspended.

Manhole Entrances—Where the ducts enter the manholes set back 4" from the inside face of the wall. Ends of the ducts shall be flush. Round the wall to the face of the ducts.

Rodding—Rod all ducts with an iron-shod mandrel 3⅝" diameter and 18" long.





J 10.4. Note on Standard Manhole Locations. Center line of duct line should be 8½ feet from curb line wherever possible. Manholes and handholes should in general take the positions shown unless prohibited by obstructions or unless standard positions are inadvisable, due to the special requirements of buildings or entrances. Lateral positions shown are deviated from as required by existing building services, cellars, etc. Distances given as approximate are subject to slight change, due to variations in width of sidewalks.

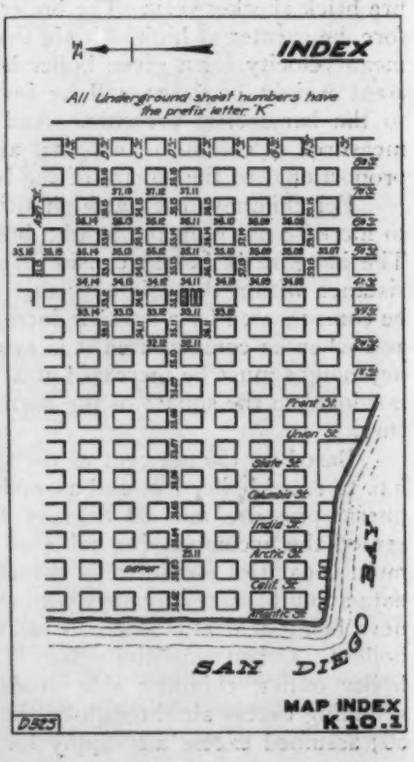
J 30.1. Concrete Mixtures—Approximate Quantities of Materials Required for 1 Cu. Yd. of Rammed Concrete.

Mixture.	Cement, Sacks.	Sand, Cu. Ft.	Stone, Cu. Ft.
1-2-3	7⅛	13.8	20.5
1-2-4	6¼	11.9	23.8
1-2-5	5½	10.5	26.5
1-2½-5	5¼	12.4	24.8
1-3-5	5	14.0	23.2
1-3-6	4½	12.7	25.4

1 barrel of cement = 4 bags = 3.8 cu. ft.

Approximate Weights.

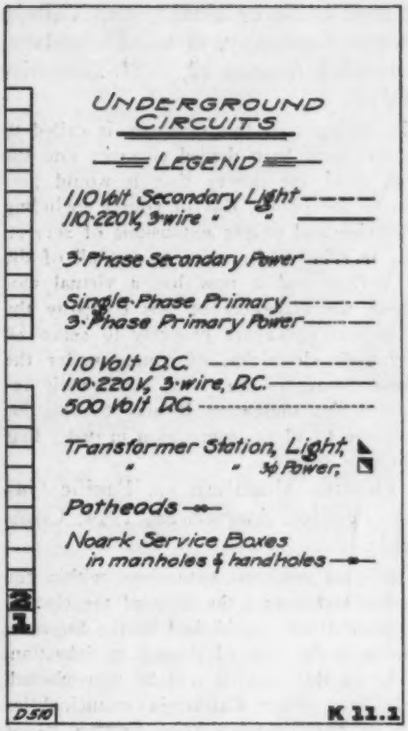
	Per Cu. Ft.	Per Cu. Yd.
Cement	95 lbs.	2565 lbs.
Sand	92½ lbs.	2500 lbs.
Stone	92½ lbs.	2500 lbs.

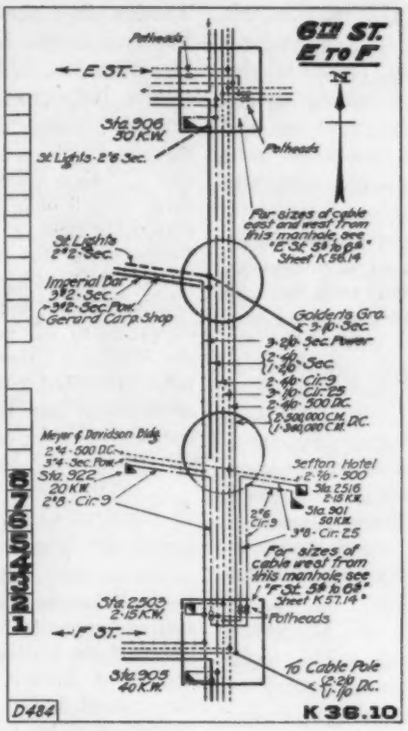


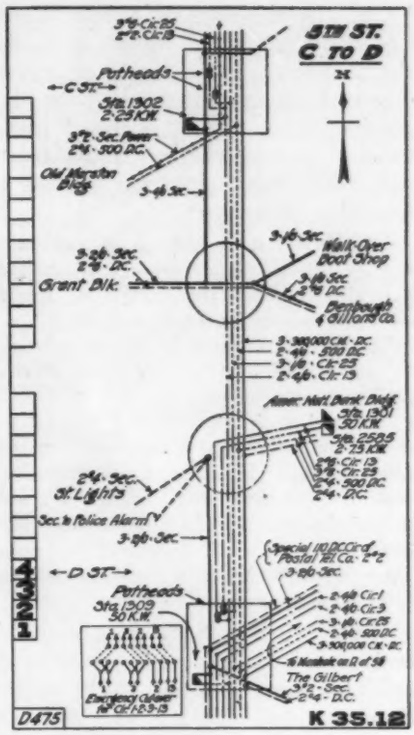
J 30.2. Material Required for 100 Linear Feet of Duct Line.

Size.	Concrete—Cement, in Sacks.	Concrete—Sand, Cu. Yds.	Concrete—Stone, Cu. Yds.	Cement Mortar.—Cement, in Sacks.	Cement Mortar.—Sand, Cu. Yds.	Total—Cement, in Sacks.	Total—Sand, Cu. Yds.	Total—Stone, Cu. Yds.
2 duct	16½	1.7	2.8	2	.15	18½	1.85	2.8
4 duct	21	2.2	3.6	5	.38	26	2.58	3.6
6 duct	25	2.6	4.3	10	.71	35	3.31	4.3
9 duct	29	3.1	5.1	16	1.15	45	4.25	5.1
12 duct	33	3.5	5.8	23	1.7	56	5.2	5.8
16 duct	39	4.0	6.6	32	2.3	71	6.3	6.6
20 duct	42	4.4	7.3	40½	3.1	82½	7.5	7.3

Above figures include an allowance of 10 per cent for waste.







Section K. Underground System Maps.

This section, containing about 75 sheets, is the largest in the book and the nucleus around which the balance of the book was gradually built. The matter given herein is of local interest only. However, we show cuts of the index map (K 10.1), the legend used (K 11.1) and two typical blocks, in order to illustrate the method of treatment. It will be noted that all main line and service cables are shown, together with switches, potheads, cable poles and transformers. The smaller service details and conduit sizes are not indicated, these items being kept only in the more complete office record. The treatment is entirely schematic, no dimensional data being given. As each block includes the manholes at both ends, every manhole appears in the book four times; the handholes appear once only.

This section of the book is probably the most useful of any, obviating as it does, frequent reference to the more cumbersome office records. It is likewise the most expensive to maintain, owing to the freqnent changes necessitated by new construction.

In conclusion, the writer wishes to acknowledge the very great assistance received from members of the electric department of the San Diego Company in compiling the notes contained in this book. Particular acknowledgment is due Mr. Ray Cavell of the record department of the San Diego Consolidated Gas and Electric Company for the painstaking and intelligent care exercised in working out the three hundred tracings from which the handbook sheets are blueprinted.

The United Light and Power Company of San Francisco is now the subject of negotiations whereby it is expected that the Great Western Power Company will assume control.

THE OBLIGATION TO SERVE.

BY CHARLES P. CUTTEN.

(Continued.)

In Public Service Commission of Maryland v. Brooklyn & C. B. Light & Water Co., 90 Atl. 89, suit was brought to set aside an order of the commission directing the company to make certain extensions. A decision of the Court of Appeals of Maryland setting the order aside as unreasonable was made on February 25, 1914. The Brooklyn & Curtis Bay Light & Water Company held a franchise permitting them to extend their mains into the town of Brooklyn in Anne Arundel County, Maryland; but they had never extended their mains farther than within a mile of the town. The town of Brooklyn applied to the public service commission for an order directing the company to furnish water in the town; and the commission made this order, although the company claimed that it could not afford to make the extension and that such extension would be unprofitable. The case was carried to the Court of Appeals. The court, in reversing the decision of the commission, said:

There are cases to the effect that a railroad company may be required to perform a particular duty necessary for the convenience of the public, even though it may involve some pecuniary loss to the company. Atlantic Coast Line v. N. Car. Corp. Com. 206 U. S. 1, 27, 51 L. Ed. 933, 11 Ann, Cas, 398; No. Pac. Ry. v. Kansas, 216 U. S. 262, 30 Sup. Ct. 330, 54 L. Ed. 272. But we know of no case holding that a public service corporation may be required to extend its plant into territory that it has not attempted to serve when the probable revenues to be derived from such service are not sufficient to pay the interest on the cost of the extension and the maintenance of the service and is unable to sell its bonds for that purpose. Such a requirement would not only endanger the service the appellee is now rendering in Curtis Bay, but would result in disaster to the company and ultimate confiscation of its property.

The Wisconsin Railroad Commission has applied the test of reasonableness to each extension ordered

by it. In the case of Beloit Water, Gas & Electric Company v. City of Beloit, 9 W. R. C. R. 258, where the company commenced a proceeding against the city to have an ordinance of the city requiring an extension to be made, declared null and void on the ground that it was unreasonable, the commission in upholding the contention of the company uses the following language:

While it is true that a public utility is under some obligation to furnish its service to all inhabitants of a community, it is also true that the patrons are under equal obligations to meet the operating expense and provide a return upon the capital necessarily invested in the property of the utility. No utility can extend its mains or other service lines indefinitely to reach a single new consumer or a small number of new consumers and at the same time furnish service to all at the same average unit cost. It is therefore necessary either to establish some rule or rules fixing equitable terms under which extensions of its pipe or other lines will be made for new consumers beyond the limits of its system, or to make frequent readjustments of rates to all consumers to fit the changed conditions. There seems to be little if any ground on which to adopt the latter in preference to the former plan.

The Public Service Commission of Maryland seems to have adopted a similar policy. The Consolidated Gas, Electric Light & Power Company of Baltimore has made a practice of charging 70c per foot for laying gas main in excess of 100 ft. per building which would be refunded at the rate of $70 for each additional building erected along the line of extension. The City Realty Company, owning a tract of land recently subdivided, applied to the gas company for service in a house which would require over 650 ft. of main to be laid and the company refused to do the work unless the City Realty Company would deposit the necessary 70c per ft. in excess of the first 100 ft. The Realty Company applied to the Public Service Commission for an order requiring the gas company to furnish service to the place mentioned. In giving the decision the commission says:

It seems to us that the requirements of the gas company are reasonable. The street in which the main is to be laid contains but one house which is more than 650 feet from any existing mains, and its obligations to its present customers, and the indefiniteness of the time when a reasonable return upon the outlay may be expected, and the probability that others similarly or even more remotely situated in relation to existing mains would make similar demands and injuriously affect the present service, would in our judgment, be to place an unreasonable burden upon the gas corporation.

The New Jersey Commission, in the application of the residents along Canal street in the Borough of South Bound Brook, decided in June, 1914, refused to order the extension of a gas main where the net revenue from the extension would not afford to the company an 8 per cent return. The commission said:

The item of interest at 8 per cent on the total investment involved for the service required conforms to the percentage allownace hitherto accorded as a fair allowance; and the item of $113.80 as interest should be allowed. As remarked previously if on these marginal extensions the company were compelled to accept a lower rate than 8 per cent, adjudged hitherto as a fair rate of return, the average return would be lessened with every such extension.

In two recent decisions the California Railroad Commission has declared its position in respect to the obligation of a utility to make extensions within a municipality served by it. In the case of Vallejo Trades & Labor Council, Complainant, vs. Vallejo Electric Light & Power Company, et al., Defendant, Decision No. 1724, decided August 12, 1914. Commissioner Edgerton said:

The attention of the manager of this company is called to the fact that its competitors have been denied entrance into the city by this commission, upon the theory that it would perform its full obligations to the public, this of course including reasonable rates, good service and proper extensions of service. Furthermore, that it has in effect a franchise to use all of the streets of the City of Vallejo and it now has a virtual monopoly. There rests upon the managers of this company the obligation to use their utmost endeavors properly to serve all the citizens of this city with electricity, of course under the rules prescribed. If these managers see fit to avoid their responsibilities and to ignore this obligation it may become incumbent upon the commission to admit competition in order that the citizens may be properly served.

In the case of Thomas Monahan vs. Pacific Gas & Electric Company, decided August 28, 1914, Commissioner Thelen said:

In so far as this question concerns extensions within the limits of incorporated cities and towns, the duty of the electric company seems to have been clearly established by the Supreme Court of the United States in the case of Russell v. Sebastian, decided on April 6, 1914. In this case, it will be remembered, the city of Los Angeles and other California municipalities claimed that by reason of the amendment of Section 19 of Article XI of the Constitution of this state, adopted on October 10, 1911, utilities using the public streets, including electric utilities, could not make further extensions without complying with such rules and regulations as the cities might under their organic laws establish. The various gas and electric companies of the state earnestly contended that this position was erroneous and that under the constitutional grant of a franchise made by Section 19 of Article XI, as it stood prior to the amendment, any such public utility which had started construction work in a city prior to October 10, 1911, had secured the right to extend its system throughout all the public streets of the city. The utilities claimed that the state's offer was an offer to grant the use of all the streets within a city and that upon the commencement of construction in any of the streets, the offer was accepted as to all the streets. This contention of the utilities was upheld by the Supreme Court. On this point, Mr. Justice Hughes, in rendering the decision, used the following language: "We think the offer was intended to be accepted in its entirety as made, and that acceptance lay in conduct committing the person accepting to the described service. The offer was made to the individual or corporation undertaking to serve the municipality, and when that service was entered upon and the individual or corporation had changed its position beyond recall, we cannot doubt that the offer was accepted. City Railway Co. vs. Citizens' R. I. Co., 166 U. S. 557; Grand Trunk Railway Co. vs. South Bend, 227 U. S., 544, 556. In this view the grant embraced the right to lay the extensions that were needed in furnishing the supply within the city."

After thus establishing the right of the utility to use all the streets of the city, Mr. Justice Hughes addresses himself to the correlative duty on the part of the utility to serve all the inhabitants. Referring to this point, Mr. Justice Hughes says:

"This construction of the constitutional provision is the only one that is compatible with the existence of the duty which it was intended, as it seems to us, that the recipient of the state's grant should assume. *The service, as has been said, was a community service.* Incident to the undertaking, in response to the state's offer was the obligation to provide facilities that were reasonably adequate (citing cases). It would not be said either that a water company or a gas company, establishing its service under the constitutional grant, could stop its mains at its pleasure and withhold its supply by refusing to extend its distributing conduits so as to meet the reasonable requirements of the

community. But this duty and the right to serve, embracing the right under the granted privilege to install the means of service, were correlative."

The rule thus established by the Supreme Court of the United States is equally sound in law and in common sense. It applies to all classes of utilities which receive a franchise authorizing them to use all the streets of a city, such as the constitutional franchise which has been granted by the state itself to all electric, gas and water companies which started construction in this state in the streets of any city prior to October 10, 1911. Each of these classes of utilities, as well as any other utility which has heretofore secured or may hereafter secure a franchise authorizing it to use all the streets of any of our California cities, is under the correlative duty of giving service to all the inhabitants of the city. While it is possible that it may be necessary in some of our cities having wide territorial extent, to modify this general rule in some respects, the present case is clearly one for the application of the general rule, I accordingly recommend that the order in this case contain a provision to the effect that the electric company shall, at its own cost, make extensions to serve all persons desiring electric service in the City of San Jose and in the other incorporated cities in the San Jose district over which this Commission has jurisdiction in this respect. The rate in this case will be established on the theory that the service is community-wide, and extensions which may be unprofitable in themselves will be taken care of in the rate so established.

I have previously indicated my dissent from the views held by Commissioner Thelen and cannot see anything in the case of Russell v. Sebastian which imposes a greater obligation upon utilities operating in California than exists in other states. It will be noted that in the portion of the decision quoted by Commissioner Thelen the court is careful to say that the obligation of the company is to "provide facilities that are reasonably adequate"; and again that it could not be said that "a gas company could stop its mains at its pleasure and withhold its supply by refusing to extend its distributing conduits so as to meet the reasonable requirements of the community." If the Supreme Court meant to hold that all demands for extensions within municipalities in California must be made in view of the provisions of the California constitution, whether reasonable or otherwise, the court would not have limited the obligation of the company to furnishing reasonably adequate facilities and providing distributing conduits so as to meet the reasonable requirements of the community.

What is a reasonable demand for an extension must be determined by the facts of the particular case under investigation. In my opinion it must at the same time furnish business sufficient to afford an adequate net return on the investment or be of such a character as to insure that amount of net revenue within a reasonable period of time. The fact that an adequate return is being made in one part of a city does not throw upon a company the obligation to take an unprofitable business in remote and sparsely settled portions of the same town the effect of which must be to ultimately increase the unit costs of supplying gas in the profitable section of the city.

If the reasoning of the Supreme Court in the case of Title Guaranty & Trust Co. v. Railroad Commission of the State of California shall be applied to a case involving the jurisdiction of the commission to compel extensions of mains within municipalities, when the question shall arise, and it shall be determined that the commission has no jurisdiction to compel extensions of facilities within cities, section 629 of the Civil Code compelling a gas company to make extensions to a distance not exceeding 100 ft. will probably be held to be a limitation upon the authority of the city as that is a general law and the authority of the city must be exercised in a manner not in conflict with general laws. In other words, the city cannot by ordinance compel extensions of mains to a greater distance that 100 ft. to serve any particular consumer. It is even questionable in view of this section 629 of the Civil Code, containing a direct expression of the legislative will in relation to extensions, whether the commission can compel extensions of more than 100 ft. to serve an applicant for gas.

From this discussion it will be apparent that the law in respect to the topic selected as the subject of this paper is very indefinite and unsettled. From the decisions, however, I think the following conclusions can fairly be deduced:

1. A gas company cannot be compelled to make extensions of its mains or facilities in territory which it does not nor has not professed to serve or held itself out as serving.

2. Neither the railroad commission nor any other body can compel a company to make an outlay for an extension, even in territory which a company professes to serve, which under the facts of the particular case would be an unreasonably large expenditure for the business to be secured. It would seem that unless the business to be secured would pay a fair net return on the investment, a court would be slow to enforce an order of a legislative body unless the case presented exceptional features.

ADVERTISING ELECTRICITY AT ROSARIO.

The Sociedad de Electricidad de Rosario, which supplies the city with electric light and power, recently opened a so-called "oficina de propaganda," or advertising office. The company has rented a large store in one of the principal business streets solely for the purpose of advertising electricity and familiarizing the public with its various applications. The company does not sell apparatus or appliances of any kind, although a great variety of articles are exhibited and explained by practical demonstration in the new branch.

The exhibit has been well prepared and charts show at a glance just what can be accomplished with a stipulated amount of current at a stipulated price by using the different appliances. Among articles exhibited are electric fans, drying apparatus, toasters, irons, curling irons, tea and coffee pots and other kitchen utensils, cigar lighters, stoves, motors for sewing machines and other household and industrial uses, etc. Electric fans and motors are already well introduced here. There is a small market for electric stoves, and when business picks up again, the activity of the Sociedad de Electricidad will probably lead to an increased demand for electric appliances of other descriptions.

The double trolley system of the Seattle municipal railways is employed to prevent electrolysis effects.

JOURNAL OF ELECTRICITY
POWER AND GAS

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Change of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon of Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

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Giving Thanks

In accordance with ancient custom, opportunity has again been offered for an expression of the gratitude we feel for blessings received. Even the most unfortunate should feel grateful that their lot is no more deplorable than it is. How much greater cause, then, have the more fortunate for giving thanks.

Comparison stimulates thanks giving. Compared with Europe, America has every reason for giving thanks. No one is in such adverse circumstances that he cannot imagine worse. Consequently everyone has good reason for giving thanks at this season.

Mere gratitude is not sufficient. This passive sense of appreciation must be made active by expressing thanks. Nor should thanks be given in the spirit of "a lively appreciation of favors yet to come." True thanksgiving dwells only in the past.

Scientific Salesmanship

Scientific salesmanship! It is a most alluring mouthful, scientific, because a few facts have been systematized into usable form, salesmanship, because the possessor of this information has learned how to sell a man something which he does not want.

The order-taker, the mere clerk who sells the customer what he really wants, is no longer to be a factor in the fierce competition of modern business. The whole business world seems to have gone mad over this fetish. Verily whom the gods would destroy they first hypnotize!

Scientific salesmanship, the psychology of selling is nothing but hypnotism. The ambitious salesman can learn more from a penny pamphlet on mesmerism than from all the sales correspondence courses ever compiled—if his ambition is that of compelling his victim to buy something for which he has no use.

Dr. Boris Sodis, one of the most eminent of the psychologists, says that "the psychologist has nothing to say on the subject of advertisements, selling and business but commonplace trivialities expressed with all the pomposity of scholastic authority. . . . Psychological business claims are illusory. The sooner the practical business man learns this fact the better for him, and also for the earnest psychological investigator."

Real salesmanship must be built upon service—anticipating the consumer's need. The secret of the German commercial success was founded upon this fact. They studied their market, found what the people wanted, and then sold it to them.

The difference between selling a man what he wants and selling him what he does not want is satisfaction.

Granting that it is possible to hypnotize a person into buying what he does not want—what is to be gained? The customer is dissatisfied, a second sale is impossible, and all business must be new business.

It seems trite to say that the article to be sold must be something that the customer really wants, whether that customer be a foreign or domestic. Yet this truism has never been appreciated by the Ameri-

can manufacturer, especially in meeting the requirements of foreign buyers. A world market can not be lasting if created by the methods of hypnotic salesmanship.

Election Results in the Northwest

As far as operators of public utilities are concerned, the principal point of interest regarding the recent elections in Oregon and Washington was the fact that both of these states voted for prohibition. Exactly what this effect will have on public utilities is hard to foresee, but one large operating company in Oregon and Washington believes its gross earnings will be reduced about 15 per cent as a result of the cessation of the liquor business. The laws do not take effect until January 1, 1916, so that some little time is left for a readjustment of business.

The Oregon election also resulted in a number of other decisions on the part of the people that are of interest to engineers in general. An effort was made to pass a law that would permit the state to go beyond the present limit of indebtedness, for the purpose of building and maintaining permanent roads, and the construction of irrigation and power projects, and developing untilled lands, but it was apparent that the people at this time decided not to eliminate this limit and, as a result, the state will not be able to go into the construction business on any more extensive scale than it has in the past.

The universal eight-hour law for men and women and a specific eight-hour law and room ventilation law for women were both defeated by the Oregon voters, as well as a measure declaring the beds of all navigable waters to be the property of the state, and another measure permitting the construction of municipal wharves and docks.

One of the most unpopular measures on the ballot was the "spite" bill to abolish the present office of the State Engineer and do away with the Desert Land Board. This bill was opposed by nearly every organization of prominence in the state, and if it had passed it would have stopped all stream flow measurements, water power investigations and topographic mapping. The bill was decisively defeated, the negative vote being five to one, according to early returns. This is taken to be sufficient evidence that the people of the state are back of the present state engineer and his plans for investigation.

The constitutional amendment, initiated by the Socialist party of Oregon, providing for a department of industry of public works, the support therefor to be derived from imposing a tax of not less than 10 per cent on all estates of deceased persons, to the value of $50,000 or over, was also defeated.

In the state of Washington, early returns indicate that the blue-sky law, convict road bill, the eight-hour bill, and a bill to provide additional first-aid-to-the-injured features to the Workmen's Compensation Act, were defeated, and in addition the bill providing for a heavy bond issue for the Quincy irrigation project also went down to defeat. As far as can be learned, the only initiative measures adopted were prohibition and the bill to prohibit private employment agencies.

The Power of Money

The opening of the Federal reserve banks brings vividly to mind the resemblance which this new financial system bears to an electric generating system. In many respects the action of electricity is a perfect image of the action of money, which is literally as well as figuratively the power which actuates our industrial life.

Imagine a great transmission network serving the diversified power needs of a wide territory. Instead of one power plant being the sole source of energy supply, there are several, so that in case of accident to any one, the pooled reserve of all the other plants is available without serious strain upon any one of them. Nor need the individual reserve capacity of any one plant be nearly as large as if it were the sole source of supply. In like manner the banks may pool their money reserves at the district Federal reserve bank, an ample central fund thus being always available without the necessity of each bank carrying a large reserve of idle capital.

The great objection to the old system was the inelasticity of the currency, its inability to expand or contract with the needs of trade. The new plan contemplates that the currency supply will be in direct proportion to the the money demand, just as in an electrical system the current supply is in direct ratio to the load demand. This is made possible by the issuance of circulating notes against commercial paper. The greater the business activity the greater the amount of commercial paper and correspondingly the more notes in circulation.

The central board at Washington supervises the doings of each district reserve bank much as the directors of a great holding company regulate the activities of its central stations throughout the country. In this way it is hoped that business activity will be stimulated that prices will be stabilized and that there will be a continuity of money supply.

The analogy between electricity and money holds in its utilization as well as in the methods of distribution just outlined. As electricity is convertible at will into light, heat or motion, so is money convertible into credit, wealth or property. In fact its value depends upon its convertibility. Changes in value are caused by economic changes, so that value is an indicating meter of economic forces

The value of money, like the voltage of electricity, depends upon an inequality, and upon the possibility of transfer from the place of supply to the place of demand. Both act only through inequalities or difference of potential. The force of the dollar in your pocket depends wholly upon the absence of a dollar in your neighbor's pocket. If he did not want it, it would be of no use to you. Without difference of potential, electricity has no power. Likewise the power of money depends upon the elevation of one portion or the depression of another, the greater the inequality the greater the value.

Many other interesting comparisons can be cited, but enough has been said to give a clearer idea of the function of the Federal reserve bank. Yet even this, has the weakness of all analogies—absurd conclusions may be reached by following them too far.

PERSONALS

F. A. Cressey Jr., manager Modesto Gas Company, is at San Francisco.

J. B. Lippincott, consulting engineer, Los Angeles, Cal., is at San Francisco.

S. M. Kennedy, general agent Southern California Edison Company, is at San Francisco.

C. W. McKillip, Sacramento Gas & Electric Company, is a recent business visitor at San Francisco.

J. Milton Chamberlin, salesman Fobes Supply Company of Portland, Ore., was a recent visitor at San Francisco.

George C. Mason has been elected president of the Portland Association of Members of the American Society of Civil Engineers, and **John T. Whistler** as second vice-president.

C. G. Emery, formerly representative for the Hughson-Merton & Co., Inc., of Los Angeles, has recently gone in business for himself at Portland, Ore.

W. P. Naser, representative Trumbull Electrical Manufacturing Company of Chicago, Ill., has left for the East after visiting the Pacific Northwest.

F. N. Killam, formerly in charge Seattle branch of the Pacific States Electric Company, is now connected with Brooks-Follis Electric Corporation at San Francisco.

R. S. Hardy of the engineering department of the Los Angeles Gas & Electric Company, has returned to Los Angeles from a trip to San Francisco and vicinity.

S. E. Hutton was recently appointed engineer for the Public Utilities Commission of Idaho, and is now engaged in investigations bearing on light and power rate cases in northern Idaho.

C. E. Heise, Western manager Westinghouse Electric and Manufacturing Company of San Francisco, has returned from a motoring trip throughout the San Joaquin Valley in the interest of his company.

Theo. Powers, formerly manager of the Pacific Power & Light Company, Waitsburg, Washington, will join the force of the Portland, Eugene & Eastern Railway Company at Portland on January 1, 1915.

H. P. Pitts, commercial engineer with the gas department of the Pacific Gas & Electric Company, has left San Francisco to attend the convention of the National Commercial Gas Association at Minneapolis.

W. V. Clark, hydroelectric engineer of New York, left San Francisco the early part of the week to examine three proposed dam sites in the Sierra Nevada Mountains to be used for a large hydroelectric plant intended to furnish current to a project for utilizing atmospheric nitrogen.

Hammond Mathews, who has been chief electrician for the Arizona Copper Company and the Arizona & New Mexico Railroad since January, 1911, has accepted a responsible position with the Arizona Power Company and the Prescott Gas & Electric Company, with headquarters at Prescott, Arizona.

George B. Muldaur, manager field co-operation for the Society for Electrical Development, has been addressing meetings of the electrical men of the various Pacific Coast cities, including Spokane, Seattle, Portland and San Francisco, during the past month. He expects to leave San Francisco about December 1st and proceed east by way of Los Angeles.

John C. Beebe, power and pumping engineer, Idaho Irrigation Company, Ltd., Richfield, Idaho, was recently elected associate member of the A. I. E. E., also **C. A. Blair**, chief electrician Los Angeles City School District, Los Angeles, Cal.; **L. W. Hope**, superintendent, Adams Hill Corp., Eureka, Nev., and **R. A. Williams**, electrical draughtsman, Pacific Light & Power Corp., Los Angeles, Cal.

Leo Dashley and **John Dodds**, electrical engineering students at the University of Washington, Seattle, have undertaken, as a thesis for their degrees in engineering, the construction of one of the largest electrical transformers in the country. The transformer when completed will be 7 feet high, 4 feet wide and 2 feet thick, and will contain 300 pounds of wire, raising the voltage from 220 to 220,000 volts.

H. H. Trowbridge, attorney for the Southern California Edison Company of Los Angeles, is at San Francisco to handle the corporation end of litigation in connection with the absorption of utilities by a municipality. Whether a municipal corporation has the right to proceed under eminent domain, take over a utility, and operate that utility in precisely the same manner as the private corporation that preceded it, is a matter for consideration.

A. E. Drendell, president Drendell Electrical Manufacturing Company of San Francisco is an expert Nimrod as well as a manufacturer of fine switchboards. His skill, however, does not extend to oil stoves, as was made evident by a fire in his hunting lodge near Alvarado last week. After strenuous migdnight endeavors he and his guests, **M. L. Scobie** and **J. A. Richmond**, succeeded in extinguishing the blaze after one end of the shack had been gutted.

MEETING NOTICES.

Utah Electric Club.

The Rev. P. A. Simpkins, familiarly known as the "Parson" by the members of the Utah Electric Club, delivered a most interesting talk before the club at its regular meeting on Thursday, November 19th, taking for his subject, "Light and Shadows of a Summer Vacation." He had planned on spending a most enjoyable vacation in his native land and for that purpose arrived in England about the middle of July. Being a keen student of human affairs his observations of conditions obtaining just preceding and succeeding the outbreak of the great European struggle make a most interesting story. He declares industrially England is rapidly being Americanized.

Electrical Committee National Fire Protection Association.

The biennial meeting of the Electrical Committee of this Association will be held in March, 1915, in New York City. As usual, the provisions of the National Electrical Code as they now exist will be considered, together with reports of all sub-committees. Suggestions for amendments to the Code, in order to be included in the Bulletin, must be specific and where a change is desired in a rule or section of a rule definite wording for such change must be given together with the reasons why the change is recommended and these suggestions, together with all committee reports must be in the hands of the secretary not later than January 15, 1915. As heretofore, the meeting will be open to all interested and such persons will not only be welcome, but are urged to be present and give the committee the advantage of their experience and advice.

Oregon Society Engineers.

The regular Monday luncheon of the Oregon Society of Engineers was held in the Crystal Dining Room of the Benson Hotel November 16th, with Mr. Eugene Brookings, as speaker of the day. His subject was "A Suggested Plan for Procuring More Efficient Legislation." Also Mr. Geo. B. Muldaur, manager of the field co-operation of Society for Electrical Development, gave a short talk upon the society's object and work. Mr. O. B. Coldwell, general superintendent of light and power of the P. R., L. & Power Company, was chairman of the day.

Mr. Brookings' suggestion for better legislation was the establishing of a "Legislative Reference Department" under the economic department of the State University to aid in collecting data in reference to proposed new laws and if

necessary draft them for legislators who so desire them. It is the same idea as used in Wisconsin and Indiana at the present day. This would insure better and fewer laws was his argument and avoid the declaring of so many laws unconstitutional.

The Jovian Electric League of Southern California

The weekly luncheon of the league, held at Christopher's, on November 18th, was attended by nearly 100 Jovians and a number of out-of-town guests. A splendid program was provided by D. H. Conover, who was chairman of the day. The musical features consisted of several songs by Fred C. McPherson, an accomplished baritone, and banjo selections by H. H. Crippen. Tribune Harry Pieper announced Messrs. McCutcheon and Granger as the reception committee for December, and settled once and for all, to his own satisfaction, at least, the question of whether "electrical" or "electric" should be used in connection with the word "league" by deciding in favor of "electric." He also presented to Former Tribune Jimmie Colkitt, in behalf of members of the league, a beautiful diamond-studded scarfpin, in recognition of his services. The three-minute talks, which have already become very popular with the members, were particularly witty and interesting, and were given by A. E. Morphy on the Edison Storage Battery Company, and J. Francis Rogan, Ralph B. Clapp on the F. F. Foster Co. and F. F. Foster and C. B. Hall on the Greenwood Advertising Company and J. E. Tucker.

These were followed by an instructive talk by Edwin W. Widney on "Trade Relations With South America." He pointed out that while we have but little surplus foodstuffs in excess of our demand, there are many products for which we should seek a profitable market. South America, with its 7,700,000 square miles of territory, has only 40,000,000 people, but vast natural resources, such as nitrates, copper, fruits, etc., and is blessed with abundant waterfalls, capable of being utilized for the generation of electrical energy. The United States merchants have been slow in recognizing their opportunities, and today we sell only one dollars' worth to Europe's seven dollars. He suggested that high-grade goods are wanted, that we must control more banks, learn more about the habits of the people, send experienced salesmen and develop our merchant marine. The war opens up new opportunities and the South American market is prepared to pay good prices for North American goods.

NEWS OF CALIFORNIA RAILROAD COMMISSION.

The commission has rendered a decision authorizing the San Diego Consolidated Gas & Electric Company to issue $250,000 face value of its 6 per cent debenture bonds payable December 1, 1922, and $240,000 par value of its common capital stock. The commission's order provides that the bonds are to be sold so as to net the company not less than 23 per cent of their face value and accrued interest and that the stock shall be sold at not less than par. The proceeds are to be used for discharging or refunding obligations amounting to $472,296.37.

The Escondido Utilities Company, operating a gas and electric system in San Diego county, has filed an amendment to its recent application, in which the commission was asked to determine the validity of a $16,000 promissory note in favor of W. S. Sheperdson. In its amended application, the company asks that if the commission authorized the renewal of this note or declare the present note, valid, it shall be in a sum not exceeding $12,000 and that the company shall not be required to pay more than that amount.

The Fresno Interurban Railway Company has filed an application with the commission requesting authority to issue $212,500 of common stock and $350,000 of first mortgage 6 per cent 25 year bonds at not less than 80. The company also wishes authority to issue $350,000 of 6 per cent cumulative preferred stock to be issued only when an equivalent amount of bonds have been retired. The company proposes to use the proceeds in building a standard gauge electric railway from Fresno eastward, with a branch line to Clovis.

The Pacific Electric Railway Company has filed an application with the commission requesting authority to issue $2,942,000 of its 50 year gold bonds, for the purpose of reimbursing itself for moneys previously expended from income for additions and betterments.

The Southern Counties Gas Company of California has filed an application with the commission requesting authority to temporarily make use of $240,500 of notes as collateral security. The issuance of these notes was originally authorized by the commission of July 18, 1914, for a term not exceeding 3 years, at a rate of interest not to exceed 6 per cent per annum.

The Coast Valleys Gas & Electric Company has filed an application with the commission requesting authority to issue $100,000 par value of its first mortgage 6 per cent 40 year gold bonds. It proposes to use the proceeds in reimbursing itself for moneys expended from income or borrowed money for additions and betterments to its system, amounting to $69,392.43. It is proposed to use the balance for further construction work.

NEWS OF OREGON RAILROAD COMMISSION.

The commission will hold a hearing at Salem on November 27 in the matter of the local, long distance and toll rates, charges and regulations of the Pacific Telephone & Telegraph Company in Oregon, regarding which a thorough investigation has been held on the commission's own motion.

The commission has authorized the Interurban Telephone Company of Silverton to increase its rates for various classes of service to an amount approximating 15 cents per month in excess of rates which have been charged in the past.

Upon the complaint of the City of Dallas the commission has ordered H. V. Gates to re-classify its consumers and serve them at lower rates.

NEWS OF IDAHO PUBLIC UTILITIES COMMISSION.

The commission handed down decisions on Saturday, November 7th reaffirming the determination of the commission not to grant certificates of public necessity and convenience to companies to enter a field which is being adequately served by the existing company. The decisions rendered had reference to the application of the Idaho Power & Light Company and the Clear Lake Power & Improvement Company to enter the field now supplied by the Great Shoshone & Twin Falls Water Power Company in the counties of Twin Falls, Gooding and Lincoln. Territory which is the goal of the two petitioning companies is that of the cities of Twin Falls and Buhl and the villages of Wendell and Filer and the country immediately contiguous. Franchises in these towns and villages were secured by the Idaho Power & Light Company between the time the public utilities act went into effect and the time it was enacted.

This company sets forth in its complaint that it has a power site on the Malad River which is most favorable for the development of electric power; that it has fulfilled the terms of its contract up to the present time, and that it now wishes to complete its arrangements with the state by completing the power plant at the Malad River. It avers that it is unable to do this with only the territory which it serves at the present time, but that it must have that in Twin Falls, Gooding and Lincoln counties.

It claims that the present rates and service of the Great Shoshone Company in that field are not such as can be furnished by the Idaho Power & Light Company and that they are not approved by the sentiment of the territory served.

These same allegations are made by the Clear Lake Company, which has a power site a short distance from Gooding and Twin Falls. For this reason both petitions are taken up together.

More than 30 pages of manuscript are used in explaining the reasons for the decision against the two applicant companies. In addition to summarizing the applications of the two companies, one of which, that of the Idaho Power & Light Company, relates the whole history of the company, the order comments on a part of the oral testimony offered and makes a lengthy defense of its usefulness and of the advantages of regulation over competition. Not only does the commission go into all these matters thoroughly, but it recites the circumstances of the previous troubles of the Great Shoshone and Idaho Power & Light Company.

The Idaho Power & Light Company began construction of its lines into the city of Twin Falls on April 29, 1913. The Great Shoshone Company complained to the commission that its rival was attempting to operate without a certificate of public necessity. The Idaho Power Company answered that it was building under the provisions of the law which provides that a public utility under certain conditions may complete any work under any permit or franchise already granted.

Such contention was ruled against by the commission and later, upon appeal by the supreme court which, in handing down its opinion in the case, upheld the constitutionality of the utilities act. This court decision is made the basis for much of the commission's holdings in the order.

In answering the propositions involved in a study of any field in such a case as the commission has before it, the commission finds that the present supply of electrical energy furnished by the Great Shoshone Company is sufficient for the needs of the territory which it controls; in constructing its works, it has planned for the future and is able to care for the needs of the territory when further demands of the country are made.

As to whether the company has discharged its duties toward the public by giving efficient service, the commission finds that many of the complaints are unjust in that they apply to the failure of the company to furnish current for heating buildings at the beginning of the season of 1913.

This service, the commission finds, is not a legitimate or justifiable use of electricity and should not be blamed to the company for the further reason that because of the Kuhn failure, it was unable at the time to acquire the machinery necessary for furnishing this current. The commission also finds that many of the complaints are unreasonable and that the service asked is disproportionate to the revenue which would be obtained.

A commendable effort has been made to serve the community, the commission finds, by the extension of the Great Shoshone Company of its lines into small villages and communities, expensive to reach.

That the Idaho Power & Light Company can furnish power to the territory in controversy at a cheaper rate than can the present company, the commission doubts. It seems no advantage of position and finds no relief from the figures that have been presented.

As a further reason for denying the rights of the petitioning companies to enter the field, the commission says that it can see no way to prevent the invading companies from taking the cream and leaving the milk for the old company. That is, it explains, that the new company could easily take the patronage away from the more profitable communities where the larger company depends for its profit and leave only the smaller ones which are less profitable.

Finding then, no point where the Great Shoshone Company has failed to supply its territory satisfactorily, the commission refuses to let either the Idaho Power & Light Company or the Clear Lake Power & Improvement Company invade its field.

In answer to the petition of the Beaver River Power Company to be allowed to compete with the Southern Idaho Power Company for the business of Pocatello, the public utilities commission in an order issued recently says: "The existing company is the pioneer company in the field and has served the same for a great many years in perhaps as satisfactory manner if not better than the average utility of like character doing business in the state of Idaho and we can see no reason why, with its superior location and other facilities it cannot furnish sufficient service at as cheap a rate as any water company in the state, and we are not convinced that the applicant company has any superior facilities or is more favorably situated for improving the service and at the same time reducing the rates than is the existing company."

Testimony was taken, an investigation made and argument heard on the matter at the same time as the commission investigated the Idaho-Oregon Light & Power Company's petition to enter the field of Twin Falls, Gooding and Lincoln counties.

Taking the load factor into consideration, the public utilities commission fails to find any discrimination between the rates charged the Marsh Mining Company and other companies furnished with power by the Washington Water Power Company. By an order handed down November 6th in the case, the commission denies the petition of the mining company to compel the company to make its rates such as to conform with the ideas of the mining company.

As the case is stated in the complaint, the Marsh Mining Company is served at its mine at Burke, and at is concentrating plant at Monarch. It paid for the service under contract until April 11, 1913, and by oral agreement continued to take the service and pay for it on the basis of the price fixed in the contract until January 1, 1914. The price paid up to this time is stated in the complaint to have been at the rate of 11.3 mills per kilowatt hour.

During this time, the mining company avers, the Bunker Hill Mining Company, the Federal Mining Company and some others in the same district with the Marsh Company paid but 8 mills per kilowatt hour. Upon finding this to be the case, the Marsh Company refused to pay at the basis of the contract further, but demanded a rate of 8 mills per kilowatt hour. The power company refused this rate and threatened to shut off the power.

The mining company secured an order from the commission enjoining the power company from discontinuing its service to the Marsh Mining Company until an investigation could be made of the rates of the Washington Water Power Company in the state of Idaho.

In its answer to the allegations of the mining company, the power company explains that its contracts with all of its companies are in the same form. It explains that the seeming discrimination against the Marsh Mining Company is not a real one, because the mining company fails to take into consideration its load factor, upon which all the charges and contracts made by the Washington Water Power Company for such service are based. By means of oral testimony and charts, the agents of the company made further representations along this same line. A clause in a contract with the Hecla Mining Company, the property of which adjoins the property of the Marsh Mining Company was also explained at this time.

The complaint of the Marsh Mining Company brought out the fact that the Hecla Mining Company had a contract guaranteeing that its rate should not be in excess of 8 mills per kilowatt hour. The explanation was to the effect that the load factor of the Hecla Company was known and that this company had put in a hoist which has been recommended by the power company. The power company, in order to insure its good faith, gave the company a guarantee that, by use of the new machine, the cost for power would not be materially increased.

Explaining that apparent discriminations of this and other kinds may be shown not to be so by an equalization of

conditions causing them, the public utilities commission decides that there is no reason to believe that the Marsh Mining Company has suffered through the rates of the power company favoring other companies.

This decision, however, the commission is careful to say, has no bearing on the reasonableness or unreasonableness of any rates charged by the Washington Water Power Company, except as they may be discriminatory in this instance. There is pending before the commission at this time an investigation into these rates and certain rates which the commission deems fair and equitable to consumers and company alike, have been put into effect pending the conclusion of the investigation and the hearing upon it.

TRADE NOTES.

Habirshaw Wire Company has transferred its sales office to its works at Yonkers, New York.

Allis-Chalmers Manufacturing Company has been awarded the contract for building the new sub-station at Smith's cove, Seattle, by the port commission at $5760.

Hunt, Mirk & Company, representing the Westinghouse Machine Company, have moved their Seattle office from 909 Alaska building to 1407 same building.

California Electric Supply Company, 643 Mission street, San Francisco, has recently made arrangements to carry a stock of Economy renewable cartridge fuses.

The Clingan Construction Company, Hinckley building, Seattle, is constructing an addition to the power house of the Alaska Treadwell Gold Mining Company, Treadwell, Alaska. The work calls for 200 tons of structural iron and two stacks.

The Northwest Advertising Company has been organized by I. W. Dudley, R. W. Nevin, et al., with factory at Howard avenue north and Aloha street, Seattle, and temporary headquarters at 501 Hoge building. The concern is incorporated for $100,000 and it is stated that an assembling plant and general headquarters will be established here. The chief article of manufacture will be an electric device which is being installed on the municipal street car lines and which will automatically flash the name of each street intersection before it is reached by the street car.

NEW CATALOGUES.

Electrical House Goods is the subject of a comprehensive catalogue of electrical supplies manufactured by Edwards & Company, of New York City.

The Century Electric Company is distributing an attractive folder entitled "Relief at Last," illustrating and describing the 1/6 h.p. Century alternating current motor.

The Edison Storage Battery Company is distributing a valuable bulletin presenting a concise description in non-technical language regarding the Edison battery. Its construction is illustrated and described and its many applications are listed. Detailed instructions are given for the operation and care of batteries and engineering reference tables are shown on individual cell characteristics.

"Light and Your Eyes" is the title of a compact little treatise on the subject of the effect of illumination on the eye, just issued by the Cooper Hewitt Electric Company. This pamphlet contains a lot of information on this most important subject, written for the benefit of the workingman. The subjects of the best kind of light for work, glare, and effect of red and blue rays on the eyes are discussed in a practical manner. "What Users of Cooper Hewitt Light Say About It," is the title of another folder just issued by this company in which some interesting experiences are given by the users of Cooper Hewitt light. A number of points are brought out particularly with reference to the preference of workingmen for this form of illumination, after having overcome the initial prejudice held by some users of this light.

CALIFORNIA ASSOCIATION OF ELECTRICAL INSPECTORS

Section of N. A. E. I.

C. W. Mitchell, President. Arthur Kempston.
Wm. G. Pennycook, Vice-Pres. B. C. Hill, Executive Comm.
John W. Carrell, Secretary-Treasurer, 814 Scott, San Francisco.

The purpose of this organization is to standardize the common practice in electrical construction with the National Code as the general standard.

Questions pertaining to electrical construction will be answered in these columns, but only from the point of view of the Code. This is a voluntary organization and the answers published under this heading must not be construed as authoritative, or binding. No attempt will be made to correllate the answer from the several Inspection Districts, as an occasional difference of opinion will tend to induce further study on subjects. All questions will be passed upon by an executive committee.

Address all communications to the secretary.

BY THE SECRETARY.

Section Meeting.

The association will hold its regular meeting November 28th at City Hall, Berkeley. We are now prepared for the winter campaign to further our unchangeable object: "To secure a better and more uniform standard of electrical construction, to promote uniform interpretation of the rules which comprise the standard, and to disseminate information and correct practice among our members"; but we will now bring up our heavy artillery and conduct a more vigorous battle instead of the trench fight we have hitherto been pursuing. The subject for this meeting will be "Proposed Changes in the N. E. Code."

Code Committee.

Of great interest to those engaged in the electrical inspection service will be a meeting next March of the Code Committee, National Fire Protection Association. With this committee rests the responsibility of keeping the code abreast with the times, both with regard to installation rules and specifications for the construction of electrical fittings and material. The parent body, the National Fire Protection Association, is composed of many organizations, and is, in short, a clearing house, as far as data on safe construction is concerned, for every institution of consequence on the continent interested in the prevention of fire. Its executive department, so far as electrical affairs are concerned, is this Code Committee.

Refillable Fuses.

One subject which will in all probability receive due consideration from the Code Committee will be refillable fuses. Makers of fuses have for the past few years been placing on the market several types of refillable cartridge fuses. Some of these fuses submitted to the underwriters' laboratories for test and criticism have successfully withstood all tests imposed upon them, though, of course, could not be classed as approved devices. The code on this point provides that the case and terminals of the device shall be so constructed that it will be difficult to replace the fusible element when melted.

The chief feature of the refillable type of fuse is the accessibility of the fusible element. Enclosed fuses can be, and in many cases are, reinforced with wire placed inside the case in a manner which will deecive the most careful observer. Sometimes the reinforcing wire is almost as large as the conductor it is presumed to protect. There is no feasible way to determine the contents of an enclosed fuse except to cut open the case, and this the inspector is reticent to do. With the refillable or accessible fuse this difficulty is in a great measure overcome; but the fuses should be so constructed that it will be difficult to refill them except with elements designed for the purpose, and so that it will be cheaper to refill them properly than improperly.

INDUSTRIAL

A MOTOR ON THE WATER WAGON.

"What is the motor doing on the sprinkling cart?" is the question every one asks when they see the accompanying picture. It obviously does not run the wagon, so that its use is somewhat problematical.

As a matter of fact, this cart is specially designed to meet conditions found in many well-irrigated districts, as around Salt Lake City where the photograph was taken. The cart does not obtain its supply from a fire plug, in the ordinary way, but from irrigating ditches outside the city.

Points are provided at frequent intervals along the ditches where the driver can plug the motor on to a power line. The motor then drives the centrifugal pump, also mounted on the rear of the cart, and fills up the tank.

Water Sprinkler Equipped With Motor Driven Pump.

The application is a severe one, as the motor is subjected to considerable dust and jolting but it has operated with entire satisfaction.

The cart is made by the Studebaker Corporation, South Bend, Ind. The motor is a 3 h.p., 1740 r.p.m. single-phase Westinghouse Electric and the pump a 1½ in. type C Worthington.

THE PETERSON OIL FILTER.

Theo. F. Dredge, San Francisco representative of the Richardson-Phenix Company of Milwaukee, has received results of tests at Cornell University which show that oil filtered through the Peterson oil filter can be used over and over again indefinitely without losing its lubricating qualities. The filter is provided with a coil which heats the oil so that water and heavy foreign particles are precipitated while passing over a series of baffle trays. The oil is afterwards filtered and ready for use. This device is applied to turbines as well as to engines and can be adopted for filtering transformer oil. Single units have a capacity of from 100 to 200 gallons per hour, and may be combined into multiple filters of two or three units each with corresponding increase in capacity.

$AV-R AUTOMATIC ELECTRIC STEAM OVEN.

The Berkeley Electric Cooker Company, Berkeley, California are placing on the market on Automatic Electric Steam Oven, known as the $av-R Steam Oven. Its use is claimed to be cheaper than coal, gas or wood, furthermore it is a saver in food values, in weight of roast meats, and eliminates burning and the constant watching necessary in other stoves. It is clean, convenient and compact and gives no dirt or ashes.

The oven is cylindrical in shape, enclosing a copper receptacle for aluminum vessels. This cylinder is thoroughly insulated and the copper receptacle consists of two copper jackets, electrically welded, containing a quantity of water and a hollow space, from which the air has been drawn, leaving a vacuum. When the current is applied the water is converted into steam at a temperature of about 60 degrees C.

Automatic Electric Steam Oven

Current is not used continuously, as when the temperature reaches a certain point the steam controlled automatic device turns off the current, and when the temperature falls below a certain point turns the current on again, thus rendering it impossible to burn the most delicate food.

This steam fills the entire enclosure surrounding the cooking vessels, but does not come in contact with them, thus performing its function of cooking the contents without the possibility of burning or scorching them. All of the mechanism is concealed and no special wiring is needed, as this is a lamp socket device. The oven has four compartments for food, all to be cooked at the same time.

A novel and useful feature applied with the $av-R Steam Oven is the time switching device, which will start the cooking at any time desired.

NEWS NOTES

FINANCIAL.

VANCOUVER, WASH.—The Yaquina Bay Electric Company, with headquarters here, has voted to increase its capital stock from $20,000 to $40,000.

SACRAMENTO, CAL.—The M. Noonan Company of Springfield, Mass., manufacturer of water pipes, is anxious to take over the entire water mains bond issue of $1,329,000. The United States Cast Iron Pipe Company is likewise anxious to take over the issue, both companies being desirous of disposing of water pipe.

BRIGHAM CITY, UTAH.—The county commissioners of Boxelder county have decided to purchase the electric light bonds of the town of Mantua. At the board meeting held here this week County Attorney W. J. Lowe appeared on behalf of the Mantua town board and presented a resolution from that board regarding the sale of bonds in the sum of $3000. The commissioners approved the Mantua resolution and then passed a resolution for the purchase of the bonds. The people of Mantua contemplate the installation of an electric lighting system, for which the proceeds of the bond issue will be used. Power will be purchased from Brigham City.

ILLUMINATION.

SEATTLE, WASH.—Property owners on Magnolia bluff have requested extension of city lighting in this district.

RIDGEFIELD, WASH.—Bratlie-McClelland Shingle Mill Company has applied to the council for an electric light franchise.

MONTESANO, WASH.—Louis Burnett has under consideration sites for gas plant for which they recently secured franchise.

TUCSON, ARIZ.—Bond issues totaling $239,000, and including a street lighting issue, will be submitted to voters at the city election December 14th.

MALAD CITY, IDAHO.—The Evans Light Cimpany is busily engaged in the installation of a light plant which will be ready for operation about December 1.

SEATTLE, WASH.—The Pacific Power & Light Company has just completed the installation of the waterwheel for its new power plant in the Naches district, Washington.

LOS ANGELES, CAL.—An election has been called for December 3, when an order for the dissolution of the Miramonte and Florence Lighting District will be voted upon.

SEQUIN, WASH.—The council has granted an electric light and power franchise to J. L. Keeler, and a committee has been appointed to arrange for street lighting during the coming year.

GREAT FALLS, MONT.—The Malta Lighting Company of this city has started the erection of a new reinforced concrete power plant to furnish electricity for power and illumination purposes.

TACOMA, WASH.—The city council has provided for the installation of a system of street lighting, consisting of metal standards at alley corners and approximately the same spacing in the blocks.

LOS ANGELES, CAL.—Sealed bids will be received by the board of supervisors of Los Angeles county up to December 14th for furnishing electricity and maintaining lights in the Newhall Lighting District.

WINNEMUCCA, NEV.—The Board of County Commissioners has set December 7th for hearing the application of W. J. Compton and Frank L. Reber for a franchise to operate a gas plant here.

SPOKANE, WASH.—Steps have been taken for the lighting of Sprague avenue from Division to Cedar street, and Trent avenue from Division to Lincoln street, with artistic electroliers, which it is estimated will cost $110,000.

RIVERSIDE, CAL.—The board of utilities has awarded a contract to the General Electric Company for street lamps and lights for houses. The contract calls for a minimum purchase on the part of the city of lamps to the value of $5000.

WHITTIER, CAL.—President Bain of the Southern Counties Gas Company, has given his word that Whittier is to be included in the cities to be supplied with natural gas. It is probable that pipe line will be extended from Whittier Narrows to Monrovia, where the company has a franchise also.

RIVERSIDE, CAL.—Representatives of the General Electric Company, Westinghouse Lamp Company and the Edison Lamp Works, were before the board last week to bid on the annual contract for supplying the city with electric lamps. The matter was laid over until next meeting for further consideration.

SAN FRANCISCO, CAL.—Supervisor Payot suggested at a recent board meeting that the Municipal Railway fund be drawn on for lamps, brackets, etc., for lighting Van Ness avenue, the cost being estimated at $28,000. It was planned to attach the lights to the railway trolley poles. The committee did not approve using the fund for this purpose.

FRESNO, CAL.—Work has been started on a generator house at the local gas works. The house will be of sheet iron and will cost $2000. One of the gas machines, which now stands in the open, will be placed in the new building. The trustees has authorized the street superintendent to issue a blanket permit to the Pacific Gas & Electric Company to dig 250 holes in paved streets in various sections of the city for the purpose of killing old service connections which are causing excessive leakage and destroying trees and grass. The work will be done at the expense of the corporation and will cost more than $3000.

LOS ANGELES, CAL.—The city council has approved a resolution providing for the condemnation of the plant and distribution system of the Southern California Edison Company in order that it may be used to serve power from the Los Angeles aqueduct to city consumers. The Railroad Commission will be asked to evaluate the property. The cost of taking over the system will be paid out of the $6,500,000 power bond issue voted by the people a year ago. The bonds still are unsold.

SAN JACINTO, CAL.—The Southern Sierras Power Company has entered into a contract with the City of Hemet whereby a series tungsten street lighting system will be installed at once. The contract provides for brackets and center suspension type fixtures, complete with lamp and shade. Current to supply this contract will be received from the company's five large hydro-electric plants at Bishop, Cal. Contract was negotiated by and between the trustees of the City of Hemet and R. B. Mateer, superintendent of the San Jacinto-Hemet-Winchester-Lake View District.

SALT LAKE CITY, UTAH.—The officials of the Utah Light & Traction Company have offered to grant substantial reductions in the rates charged for electricity for lighting and power purposes in Salt Lake City in consideration of the city commission granting them the permission to consolidate the franchise granted to the Merchants Light & Power

Company with the franchise granted to the Utah Light & Railway Company, both of which have been acquired by the Utah Light & Traction Company. The company offers to reduce the retail lighting rates from 10c to 9c for the first 250 kilowatt hours, and from 9c to 8c for the second 250 kilowatt hours. They propose also to reduce the price charged for flat rate arc lamps from $5.55 per month, $6.67 per month, and $11.11 per month for 10 p.m., midnight and all-night service respectively to $4.00, $5.00 and $8.00 per month respectively. The company proposes to reduce the base rate on direct current from 11c to 9c for the first 100 kilowatt hours used per month, and the base rate on alternating current which is the kind of energy most generally used in Salt Lake City from 10c per kilowatt hour to 8c per kilowatt hour for the first 100 kilowatt hours used per month. The commission and the company officials have agreed on the major portion of the proposed changes and the minor details are being worked out and it is expected that a decision will be reached in the near future.

TRANSMISSION.

ASHTON, IDAHO.—A contract has been awarded to Malcolm & Larson for the construction of a large concrete dam for the Ashton-St. Anthony Power Company; $54,000 is the amount of the bid.

AUBURN, CAL.—In order to comply with a state law, which compels power companies to ground all 60,000 volt insulators, the Pacific Gas & Electric Company had the necessary work done in this section.

ASTORIA, ORE.—The Pacific Power & Light Company is locating a line for power to Warrenton, Hammond and Flavel, so that the matter can be submitted to the county court and the construction started.

WEAVERVILLE, CAL.—The California-Oregon Power Company has applied for a franchise to erect poles, etc., for transmitting electricity in Trinity county. Sealed bids for the sale of such franchise will be received up to January 7th.

ARLINGTON, WASH.—The Jim Creek Water, Light & Power Company has requested the Snohomish county commissioners to fix a date for hearing an application for franchise to operate electrical power lines along certain county roads.

LOS ANGELES, CAL.—An ordinance has been passed creating a conduit district within this city and prohibiting the maintenance of wires and poles for the transmission of electrical energy within the district, which includes all portion of Los Angeles street, between Alameda street and the southerly line of Plaza street.

PORT ANGELES, WASH.—The Olympic Power Company is installing at its Bremerton substation a 500 k.v.a synchronous condenser, which is direct connected to a synchronous booster. This is designed especially to give voltage regulation to both the Bremerton distribution lines and the lines feeding the Puget Sound navy yard.

OGDEN, UTAH.—The Grand Canyon Canal & Power Company has been incorporated to develop power of John Day's River in eastern Idaho and western Wyoming. The purpose of the company is to enter into general hydro-electric power business, to build electric transmission lines, irrigation canals, to operate electric plants and develop mine and oil and timber holdings. H. J. Craven, Ogden, is among the incorporators.

TRANSPORTATION.

SAN FRANCISCO, CAL.—Bids are being taken by the board of works for steel rails, rail joints and fastenings for the Seventeenth street car barn.

SAN FRANCISCO, CAL.—The board of works will receive sealed bids until December 2d for the construction of the California street line of the municipal railway system. Bids must be on forms furnished by the city engineer.

LEWISTON, IDAHO.—The state highway board has voted approval of a franchise to A. G. Nortz, Lewistown, for a street car line across the inter-state Lewistown-Clarkston bridge. The car line is to be in operation by September 1, 1915.

SEATTLE, WASH.—The Chicago, Milwaukee & St. Paul Railroad Company announces that preparatory work is to be started at once for continuing the electrification of its Puget Sound extension between Avery, Idaho and Harlowtown, Montana, a main line distance of 440 miles.

TUCSON, ARIZ.—A new franchise for the Tucson Rapid Transit Company will be voted on at the city election to be held December 14th. The new franchise is for 25 years and had been requested by the company to allow it to build a new line on Main street, to Pastime Park and Speedway.

FRESNO, CAL.—C. O. Whittemore, who has been associated with Senator Clark on the Salt Lake line and was vice-president and general counsel of the Clarke roads in Nevada, has become associated with John B. Rogers and the Mahoney Bros., in the construction of the interurban out of Fresno.

CALDWELL, IDAHO.—A movement has been inaugurated by the Caldwell Commercial Club to secure the electrification of the Wilder branch of the Oregon Short Line, extending from Caldwell to Wilder, a distance of approximately 11 miles. It is understood that the Short Line is willing to lease the property for a long term of years to responsible parties and an effort will be made by the Caldwell, Wilder, Greenleaf and Homedale commercial organizations to interest the Caldwell Traction Company in the plan. The local organization appointed a committee of three, Messrs. J. H. Lowell of Roswell, I. S. Binford and B. M. Holt of Caldwell to investigate the plan and to co-operate with the committees to be appointed by the other organizations.

SAN FRANCISCO, CAL.—The supervisors' committee on public utilities last week listened to a committee representing the district improvement clubs, which asked that immediate arrangements be made for routing cars of the United Railroads over the Municipal tracks to the Exposition grounds next year. It was agreed that the proposed general exchange of transfers between Municipal Railway and the United Railroads during the Exposition would not be practicable, and this proposition was dropped. Mayor Rolph approved the request of improvement clubs to run the Stockton Street Municipal Railway cars over the Fourth street tracks of the United Railroads to or beyond the Southern Pacific depot. The utilities committee chairman stated that conferences with the United Railroads officers were being had on the subject.

TELEPHONE AND TELEGRAPH.

SAN FRANCISCO, CAL.—The new telephone directory shows a total of 174,310 telephones in the bay counties, a decrease of over 7000 since June.

CHANDLER, ARIZ.—C. Oakes, foreman of the Mountain States Telephone Company, inspected the Chandler lines recently, preparatory to starting work of remodeling and improving the present system.

FRESNO, CAL.—In order to maintain better service and to take care of the increasing business, three new sections of switching boards are being installed in the local office of the Pacific Telephone & Telegraph Company. The work of installation will not be completed until February 15, 1915. Another change that will be made in the office to better the long distance service between Fresno and San Francisco and way stations, will be to have all long distance calls come directly into the local operators and they will connect with the party being called here. This will do away with the delay caused by the call going through the local long distance operator. Long distance calls being placed in Fresno will be handled the same as in the past.